AN ELECTRIC DAIRY

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APRIL 21, 1933

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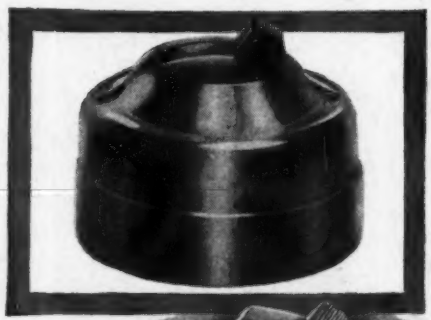

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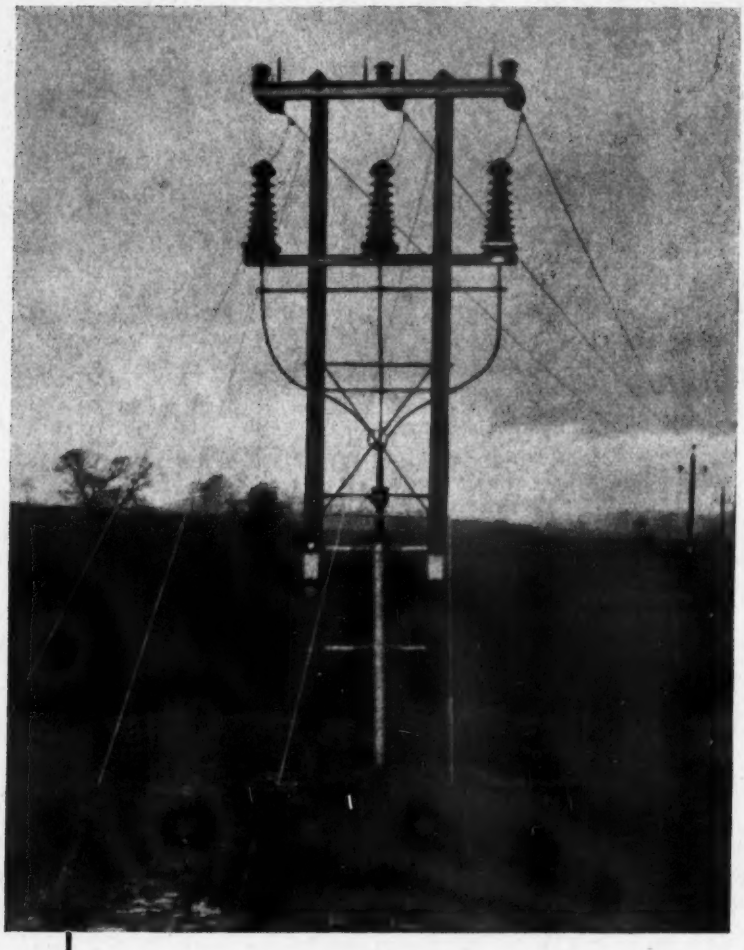

The illustration shows 33-kv transmission line for the Exe Valley Electricity Co., Sowton to Silverton, employing steel-cored aluminium conductors. (This photograph is shown by courtesy of the Exe Valley Electricity Co.)

33-kV line—S.C.A. conductors

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A South African Parallel

THE Electricity Supply Commission of the Union of South Africa has taken the occasion of the tenth anniversary of its coming into being to review electrical progress in the Union. The Commission started to operate in 1925, and some useful parallels may be drawn with the British national scheme, since the Commission corresponds in its essential features with our Central Electricity Board, not to our Electricity Commission, which finds its South African counterpart in an Electric Control Board.

The S.A. Commission primarily resembles the C.E.B. in being a non-profit-making body, with its members chosen by the Government, but working on company lines, and not as a State department. This principle has worked well, as, it is stated, on no occasion has any attempt been made at political interference. For the first seven years the Commission was financed by Treasury loans, and made a surplus. It has not until recently raised money by public subscription, as the C.E.B. has done throughout.

Unlike our own Board, which has been able to confine its constructional activities to linking up power stations, existing or contemplated, owned by authorised undertakings, and erecting lines for giving bulk supplies, the Commission has found it necessary to build five generating stations to meet the needs of the different regions covered by its operations. Geographical considerations prevent regional interconnection. Thus the benefits from cheap generation, due to the use of duff coal at Witbank (where the production costs are among the lowest in the world) cannot be extended to other regions which profit mainly through the installation of larger units and more modern plant than would be feasible with independent generation (including such modern developments as 33-kV alternators, and the use of the "wired-wireless" system of communication) and the giving of bulk supplies and the development of local distribution also in some instances.

The low density of population outside the towns has prevented the development of rural electrification, such as we expect in Britain, except round the Cape, where an extensive 33-kV system is proving a boon to the farming communities.

The Commission has enjoyed one great advantage in that in two regions railway supplies have provided nucleal base loads. Incidentally, the substitution of electricity for steam in Natal has enabled a much higher average speed to be maintained on gradients owing to the practically unlimited supply obtainable from the Commission's system. The transmission lines used for these supplies have been tapped to supply almost all the towns and villages along their route.

General developments are indicated by a growth of kWh sold by the Commission from 160 million in 1926, to 900 million in 1932, and an increase in the number of towns supplied with electricity by 110 during the decade, while the price per kWh has fallen in every undertaking connected with the Commission's system. These results have been made possible only by the same willingness to work in with the Commission that is now evident in the Home country.

London in 1971

WHAT sort of a London will it be in the year 1971 when, according to the Acts, the undertakings of the London electricity companies are transferable to the London and Home Counties Joint Electricity Authority? And what will be the charge per unit then? Hardly questions of immediate practical importance, yet looking forward is quite as desirable in things electrical as in things architectural. Marked as have been the changes in the past forty years, we may expect them to be more marked and more rapid in the next forty. Old, unpretentious and dilapidated buildings by the thousand now giving accommodation to a few are doomed, and will give place to large and magnificent ones housing their hundreds and thousands of men and women when substantial revival of commerce, finance and industry takes place. Electrical service

will be required both in kind and in volume far beyond the conceptions of those who laid our original electricity systems, and, perhaps, far beyond our own. There should be bigger business than ever for the electrical installation engineering trade and for suppliers of electricity. Changes are effected more rapidly now—when once they are taken in hand—then ever before. Mr. Knapp-Fisher, as an architect, was recently critical and suggestive regarding replanning, asked whether all railway routes into the city should not be electrified and placed underground, discussed the location and design of air ports, and mentioned the advantage that the grid offers for better distribution and decentralisation of industry. Open spaces in and around London should be preserved for farms and recreation by means of arterial roads and satellite towns electrically served. If Mr. Purse ever needs a respite from his arduous J.E.A. duties what a chance for dreaming dreams and seeing visions of 1971!

Imported Accessories

The B.E.A.M.A.'s application for a Marking Order in respect of imported electrical accessories was heard by the Board of Trade Standing Committee last week. Support was forthcoming from a variety of bodies, including trade unions, the Electrical Association for Women, and the London and Home Counties Joint Electricity Authority. The applicants' case was that a great proportion of these accessories are close copies of British products, and their appearance is such that it is impossible, even for experts, to distinguish them from their prototypes. This was deftly countered by Mr. F. W. Challis, who used an argument which we have often heard pressed upon the British manufacturer: that goods for export must closely conform with the requirements and standards of the foreign buyer. The Committee is reporting to the Board of Trade, whose decision will be made known shortly.

Neon-sign Regulations

The rapid growth in popularity of neon signs has made urgent the need for standard requirements governing their installation. The I.E.E. Council has wisely issued a set of rules (copies of which are available to members free of cost) as a supplement to the ninth edition of the Regulations for the Electrical Equipment of Buildings, instead of waiting to include them in the tenth edition, which is in course of preparation. The new rules apply to lamp signs and to luminous-discharge tubes operated at 500 V and above except those of the hot-cathode type. They do not stop at installation, as they make the important recommendation that the whole of the high-voltage apparatus and cables should be examined at least once in three months by a competent engineer. The defect of the regulations, which are representative of the best practice, is that they are not obligatory. Anyone can now build up a neon sign from purchased components. Unskilled work has caused enough trouble even with low-voltage interior lighting installations. It may cause much more with high-voltage installations that have to withstand all weathers.

Electrical Faults in Automobiles

The Royal Automobile Club, analysing the causes of breakdowns on the road which came under its notice during last year, states that more than one-fifth of the breakdowns dealt with were due to ignition troubles. The change-over from magneto ignition to the use of the coil and distributor system seems to have resulted in only a small improvement. There has been a slight advance in the proportion of breakdowns in electric starters, from 0.9 per cent. in 1927 to 1.2 per cent. in 1932, while the percentage of cars which have needed help on account of lighting failures increased from 2 per cent. in 1928 to 2.5 per cent. last year. Although, no doubt, the cause of the electrical breakdowns is due more to lack of attention on the part of automobile owners than to any inherent faults in the design of the various components, the fact that the electrical equipment of motor vehicles is still held responsible for over 24 per cent. of the various causes of faulty car running is a matter that merits the careful attention of all associated with the design and manufacture of automobile electrical equipment.

Showrooms a Necessity

Sir Andrew Duncan made a significant remark regarding electricity showrooms at the opening of the new power station at Sheffield. The undertaking is the fifth largest owned and operated municipally, and its charges are exceptionally low. The ambitions of its management are to be lower than all others—yet it has no central showroom. Sir Andrew showed his appreciation of such exhibitions as a means for accelerating development by expressing the hope that the city would not long remain without one. May we remark that if such advice is applicable to Sheffield it should be taken seriously to heart also in many other places? The practical demonstration seen by its thousands becomes the subject of conversation between tens of thousands. Always and everywhere a most valuable propaganda weapon!

Electrical Transport

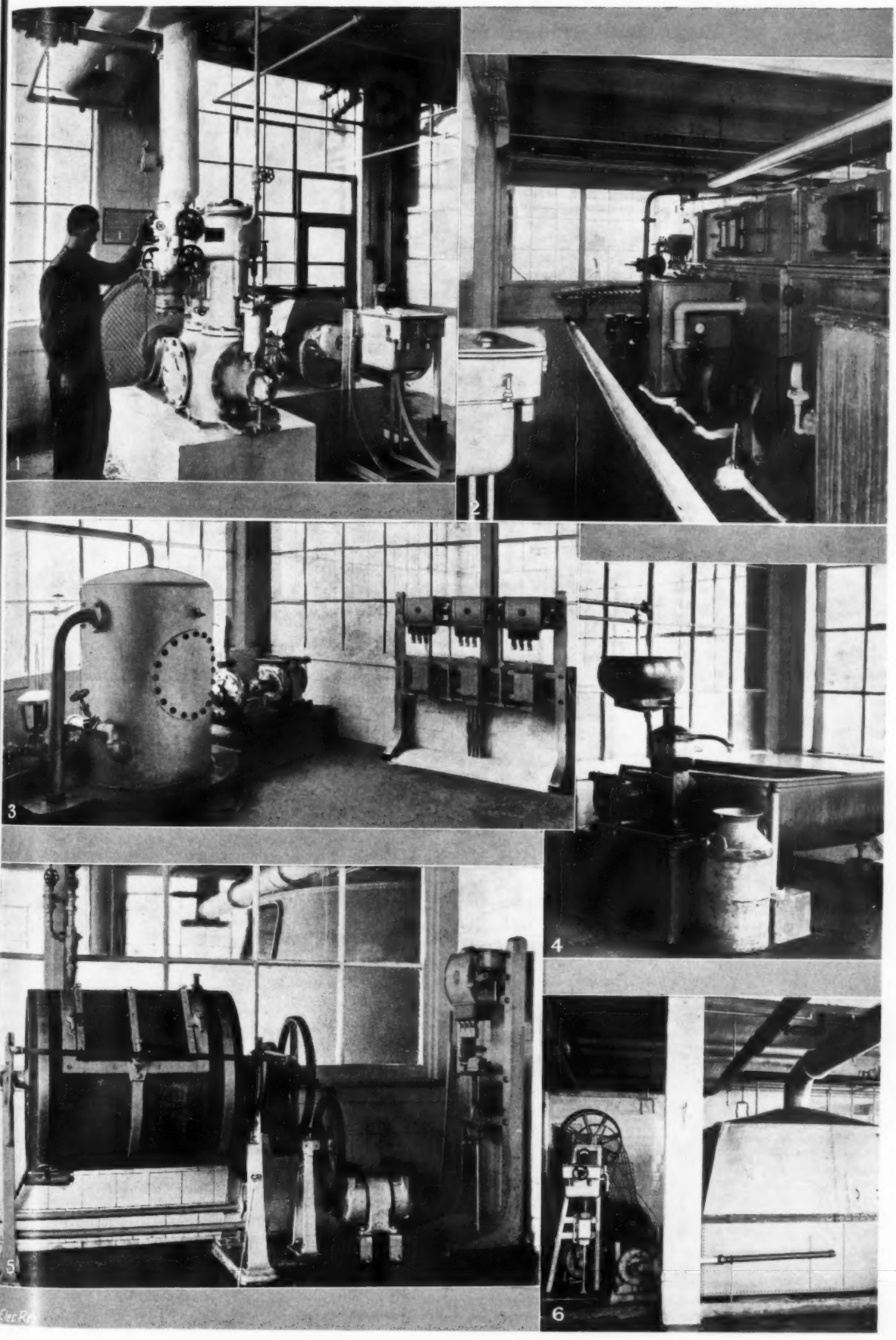
Relative cheapness in operation is only one factor in deciding the merits of different forms of transport. Therefore, we believe that Mr. C. J. Spencer, in his I.E.E. paper, was right to base the claims of the electric trolley omnibus on such grounds as silent operation, freedom from smell, and high acceleration. If, as at Wolverhampton, lower operation costs of themselves make it worth while to substitute the electric for the petrol vehicle that is a very great advantage. But, even if the costs were equal, the ultimate justification will be that the electrical method best meets the needs of the travelling public.

Public and Private Supply

At the starting up of a large slabbing and blooming mill which has been converted to an electric drive, energy being taken from the Clyde Valley Co., Sir Andrew Duncan stated that in no normal industrial supply could a private plant—if properly costed—produce more cheaply than a public undertaking. We assume Sir Andrew intended the expression "properly costed" to apply also to the undertaking, as some tariffs do not make this self-evident, and load is lost to the public system on that account. But even if properly estimated costs should not show a margin in favour of public supply, there is a very good reason for giving it preference. The addition of industrial load will hasten the time when prices can be reduced by the undertaking, whereas the costs of production with a private plant will seldom be lowered.

The Russian Affair

On Tuesday the curtain fell on the first Act of the great Moscow Farce. Immediately the news reached London that five Britons had been sentenced—Messrs. Monkhouse, Cushny, and Nordwall to expulsion and Messrs. Thornton and Macdonald to imprisonment—a meeting of the Privy Council was summoned and the King held a meeting at Windsor Castle for signing the proclamation prohibiting the importation of Russian goods, which was expected to be published on Wednesday evening. An appeal against the sentences on Messrs. Thornton and Macdonald was being lodged, and it was hoped that the imprisonment penalty would be commuted to deportation. British electrical men will await with interest the full statement which is to be issued by Metropolitan-Vickers, but in a Press interview on Wednesday one of its directors stated that the company would not cease its operations either at Trafford Park or in Russia; the British members of the staff remaining at Moscow were well able to take charge. Messrs. Monkhouse, Cushny and Nordwall were to leave for England last night. No announcement of future policy will be made at present.



The Bradford Co-operative Society's Electric Dairy

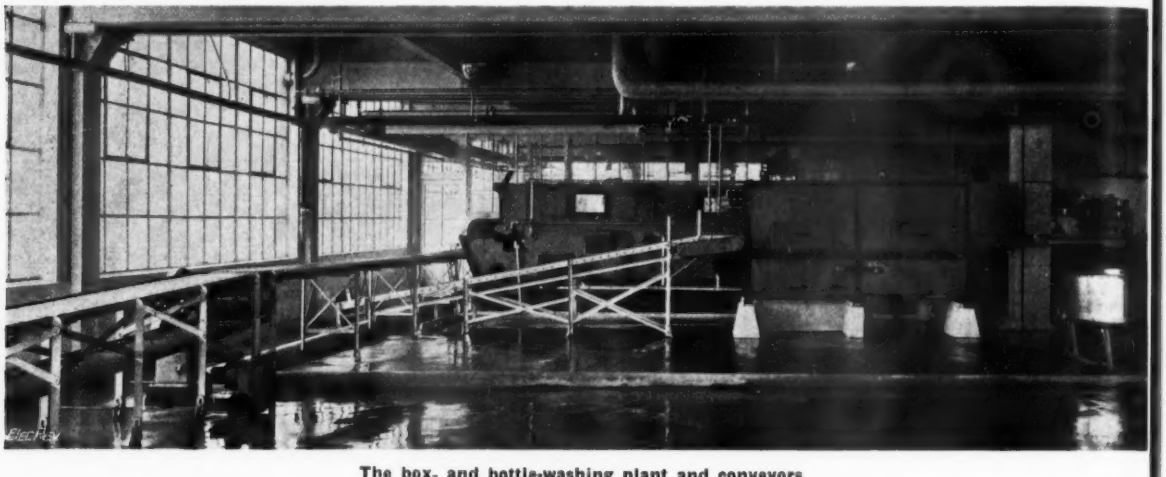
1. The ammonia compressors. 2. The bottle-washing plant. 3. A view of the pasteurising room. 4. A milk separator. 5. One of the butter churns. 6. The churn-washing equipment

Electricity in the Milk Industry. By S. Gunson

The new dairy of the Bradford Co-operative Society

An essential feature in the production of pure milk is cleanliness of the machinery and utensils, and most dairy plant is designed to allow for complete hosing down, with a plentiful supply of water daily. The suitability of the electric motor for direct coupling to the driven machine makes it practically a part of the latter and subject to the same conditions. This necessitates generally a motor capable of withstanding damp air continually and in many cases with a splash-proof enclosure, as pipe-ventilated machines may interfere with the layout of the plant and totally enclosed machines may be too large and expensive. The starters and wiring must also be waterproof to withstand this treatment. Efficient earthing is of vital importance.

A new dairy having a capacity of 1,600 gal. of milk per hr. was opened in Bradford early this year by the City of Bradford Co-operative Society, Ltd., where milk is received from the farmer, treated and bottled, and despatched to its members. Upon delivery the churns are placed on gravity conveyors which forward them to a tank into which the milk is emptied. From this tank the milk is weighed and delivered into the receiving tank. The empty churns travel on, again by conveyor, to a washing plant, capable of handling 350 churns per hour, in which a 12-h.p., 1,500-r.p.m. slip-ring motor of the splash-proof type drives a hot-water pump, caustic soda pump, and a fan. Meanwhile a centrifugal pump driven by a 3-h.p., 1,500-r.p.m. totally enclosed squirrel-cage motor transfers the milk to the process room where it is cooled in a special pre-cooler before entering the raw-milk storage tanks, of which two are in use, each capable of holding 1,000 gal.



The box- and bottle-washing plant and conveyors

Milk-treating Processes

The milk is raised to a temperature of 145 deg. F. in a heat exchanger; this consists of a device whereby milk passes on one side of a copper sheet whilst a heating (or cooling) fluid flows on the other side, the temperature of the milk depending not only on that of the heating or cooling medium but on the relative rates of flow, the exchange of heat taking place through the sheet. Filtration is the next process, after which the milk passes into insulated aluminium holding tanks (from which the air is then exhausted by a vacuum pump driven by a 2-h.p. splash-proof squirrel-cage motor), and its temperature is held at 145 deg. F. for thirty minutes. When this period has elapsed, compressed air is admitted to the tanks, and the milk is forced by this means through a second heat exchanger where the previous process is reversed and the heat is abstracted from the milk. The cooling process is carried out first by water and then by brine. The exhausting of the air from, and the admission of compressed air into, the tanks is regulated by an automatic device, termed the "controller" which, driven by a squirrel-cage motor, connects each tank with the vacuum or compressed air at the correct time.

Two ammonia compressors driven by slip-ring motors through "V" belts are situated in the basement, and one of these is a 60-h.p., 1,500-r.p.m. motor. In each case an oil-immersed combined stator-rotor starter surmounted by an ammeter is used for the control of these machines. The final destination of the milk in bulk, after leaving the second heat exchanger, is a large aluminium holder, whence it passes to the bottle-filling machine from which it emerges bottled.

Whilst the milk is passing through these stages the bottles and the boxes are cleaned ready to receive it. The used bottles and boxes are unloaded from the retail delivery carts and pass along conveyors to their respective washing plants. The conveyor is driven by a 1-h.p., 1,500-r.p.m. splash-proof squirrel-cage motor through a reduction gear. The plant illustrated was hosed down just prior to photographing and the resultant small pools of water are still visible in several places. The box-washing machine, which is seen in the background of this view, is fed from the first conveyor by a second conveyor at right angles to it and the various operations of soaking, washing, and rinsing are carried out by the aid of a 6-h.p. squirrel-cage motor.

Bottle-cleaning Plant

Meanwhile, the bottles are passed along a conveyor into the bottle-washing machine where 7,200 bottles can be cleaned per hour. Each bottle requires approximately ten minutes for its passage through the machine, and during this period is sprayed many times at high pressure with hot caustic solution and hot and cold water, and is finally dried ready to receive the milk. Three motors are fitted on this machine: a 3-h.p., 1,500-r.p.m. squirrel-cage motor driving the conveyor carrying the bottles through the machine; a 12-h.p., 1,000-r.p.m. motor direct coupled to a centrifugal pump for the caustic soda; and an 8-h.p., 1,500-r.p.m. motor driving a cold-water pump. After undergoing the cleaning process the bottles pass to the filling section of the machine where they are filled and capped, meeting at this stage the clean boxes into which they are placed and conveyed to the cold store ready for despatch.

The refrigerator room contains a brine tank, on the top of which is mounted a 2½-h.p., 1,000-r.p.m. vertical-spindle motor driving a brine agitator. Three pumps are also installed in this room: a water pump driven by a 5-h.p., 1,500 r.p.m. motor; a brine pump, for supplying the brine used in cooling the pasteurised milk, driven by a similar motor; and a second brine pump driven by a 1-h.p., 1,500-r.p.m. motor for supplying brine to the cold store. The control panel in this room consists of two direct-on starters and three star-delta starters for the machines in the refrigerator room and a fan motor in the cold store.

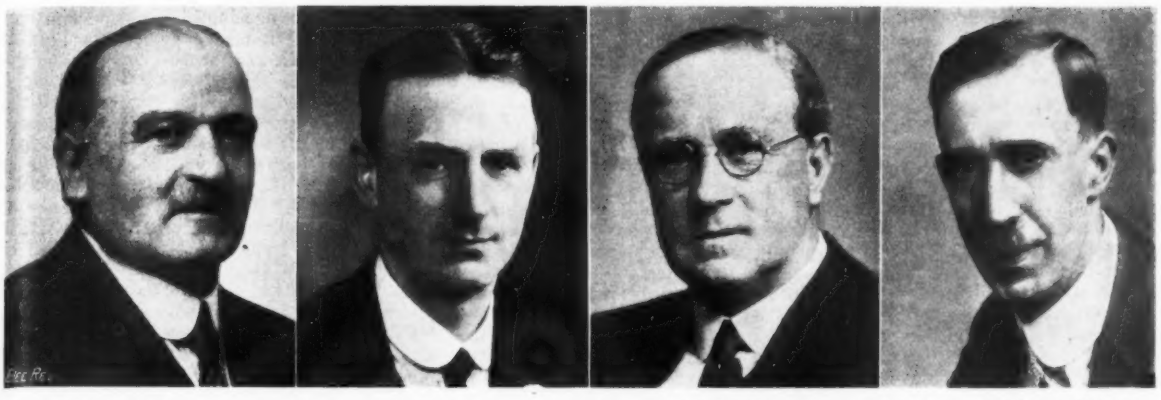
Other Applications

A further pump room is situated in the top floor of the building; this houses a centrifugal pump driven by a 2-h.p., 1,500-r.p.m. motor, and a pump driven by a 5-h.p., 1,500-r.p.m. motor for circulating the hot water which heats the milk during the pasteurising stage. A further 3-h.p., 1,000-r.p.m. motor drives an air compressor through a "V" belt. Auxiliary machines include a butter churn and worker, driven by a 1-h.p., 1,500-r.p.m. motor through gearing, and a milk separator, having a capacity of 100 gal. per hour driven through a belt and jockey pulley by a ¼-h.p., 1,500-r.p.m. machine.

In the cold store is a large air cooler containing pipes in which brine is circulated; the air is drawn in at the bottom of the cooler, over the pipes, and discharged through openings at the top by means of a fan driven by a squirrel-cage motor. The temperature of the room is automatically retained at a constant level by thermostat control.

My thanks are due to the Co-operative Society and to the English Electric Co., by whom practically the whole of the motors and control gear were supplied, for assistance given in furnishing the information and illustrations in this article.

Some Municipal Electrical Engineers



From left to right: Mr. J. H. Bowden, Poplar; Mr. R. Lee, St. Pancras (*Lafayette*); Mr. L. L. Robinson, Hackney (*Elliott & Fry*); and Mr. Hedley Large, Stoke Newington (*Elliott & Fry*).

Paper-insulated Cables. By "Dielectric"

Will the new Standard Specification help to reduce distribution costs?

THE new Specification for paper-insulated cables issued by the British Standards Institution* represents a serious contribution on the part of the cable industry towards cheapening electricity supply. The first Standard Specification (B.S.S., No. 7) was issued in 1904, and has undergone several revisions. Since the last revision in 1926 more than 5,000 copies have been distributed in all parts of the world. It covered both paper-insulated and rubber-insulated cables, but as regards paper-insulated cables it is now superseded by the new Specification.

Experience showed that the thickness of insulation and metallic sheath laid down in B.S.S. No. 7 for paper-insulated cables could be reduced without lowering the factor of safety. The British Standards Institution, which represents users as well as manufacturers, decided to revise the Specification for such cables, and there is good ground for anticipating a downward revision in cable price-lists. The principal changes introduced into this Specification, as compared with B.S.S. No. 7, fall under the following headings: additional sizes of conductor, amended voltage ratings, new tables, thicknesses of insulation, thicknesses of metallic sheaths, voltage tests, colour scheme for cores, and galvanising test for armouring wires.

In the old Specification the largest size of conductor in cables for 2,200 V and above was 0.25 sq. in., but the range has now been increased to 0.75 sq. in. (except in the case of 10,000-V and 20,000-V screened cables). Conductors above 0.3 sq. in. are regarded as being required for special purposes, although no technical difficulties are involved, either in the manufacture or operation. Of such cable it is often more economical to employ two or more cables of smaller area.

Voltage Ratings

Cables are now rated in terms of the delivered voltage,† and what was formerly known as a 6,600-V cable is now referred to as a 6,000-V cable, but the Specification states that the cables are designed for use at voltages (formerly known as the "station voltage") up to 10 per cent. in excess of the delivered voltage (declared pressure) of the system. There is one exception; 10,000-V cables are to be designed for voltages up to 11,500 V, because there are a number of systems in this country still working at 11,000 V.

Several tables are introduced, the first of these being for cables rated at 460 V, with a maximum pressure of 500 V. These cables are non-belted, but are finished with a binder tape round the laid-up cores. This table has been introduced to meet the need for a cheaper cable than the 660-V rating which was previously the lowest. The next table is for 1,000-V cables (in the old Specification there was nothing between 660 V and 2,200 V), and supersedes the old table for 600-V cables, there now being nothing between the 460-V and 1,000-V ratings. As regards thicknesses of dielectric, the new 1,000-V and the old 660-V cables are identical.

A table for single-core 1,500-V cables has been introduced, primarily to meet the requirements of 1,500-V d.c. railway electrification systems.

The old Specification did not cater for screened cables for 10,000 V or for any type of 20,000-V cables. Tables have now been included to cover these. Provision is made for single-core, three-core belted, three-core screened, and "S.L." types of 20-kV cables intended for use only on systems having the centre-point earthed.

Thickness of Insulation and Sheathing

In the old Specification the thicknesses of insulation stated in the tables were *mean* values, and a tolerance of 10 per cent. below the specified thicknesses was allowed. In the new Specification the method of stating the thicknesses has been changed, the figures given in the tables now being the actual *minimum thicknesses at any point in the wall* of the cable. The *actual* thicknesses of insulation, after making allowance for the different method of expression, are lower than before, except in the case of cables for voltages below 2,000 V. The case for this reduction in the thicknesses of insulation is based mainly on experience of the behaviour of cables which are working in all parts of the world with lesser thicknesses of insulation than those hitherto laid down.

The reductions of insulation and lead thicknesses will be reflected not only in the cost of cables to purchasers in this country, but will be of considerable benefit as regards our exports to foreign and colonial markets.

The new method of expressing the thicknesses of metallic sheathing is also minimum values at any point in the wall, instead of mean figures subject to a tolerance. The new sheath thicknesses are calculated from the following formulæ, and rounded off to the nearest 0.01 in.: single-core cables, $t=0.9(d/23+.045)$; and multi-core cables, $t=0.9(d/23+.035)$; where t=minimum thickness of sheath at any point (inches), and d=diameter under sheath (inches).

The thicknesses of sheath of single-core cables are the same as before, except that in no case is the thickness (minimum at any point) less than 0.06 in. In the case of multi-core cables some adjustments to the old figures have been made and, generally speaking, the thicknesses are less than previously, but in no instance is it less than 0.06 in., or 0.07 in. for screened cables.

A change has also been made in the method of measuring the thickness of the metallic sheath. This thickness is now taken on a *ring* cut from the sheath, whereas in the old Specification, the measurement was made on a circumferential strip flattened out. By the old method it was difficult to flatten the strip properly without causing unevenness in the thickness.

Pressure Tests

The voltage test on the cable *when laid and jointed* may now be made with either a.c. or d.c., whereas no provision for a d.c. test was formerly made. The test pressure, as applied (between conductors and between each conductor and earth) to the cable when laid and jointed, is twice the delivered voltage of the system for an a.c. test, and three times the delivered voltage for a d.c. test; these values being divided by $\sqrt{3}$, when the test is applied with three-phase a.c. pressure (between each conductor and earth) to cables in-

* B.S. Specification No. 480, 1933, "Dimensions of Metal-sheathed Paper-insulated Plain Annealed Copper Conductors for Electricity Supply."

† See B.S. Specification No. 77, "Voltages for New Systems and Installations."

tended for three-phase systems having the centre-point earthed.

For cables rated at less than 2,000 V, the test voltages "at works" (applied between conductors and between each conductor and earth), are: for 460-V cables, 2,500 V; and for 1,000-V cables, 3,000. For all cables rated at 2,000 V and above, the test voltage=2E+4 kV where E is the delivered voltage. Here, again, the figure is divided by $\sqrt{3}$ when the voltage is applied (between each conductor and earth) to cables intended for three-phase systems having the centre-point earthed. A system is regarded as an earthed system only when it is permanently connected to earth, through a negligibly low impedance, or when a device is installed which automatically and instantly cuts out any part of the system which becomes accidentally earthed. When the outer conductor of a concentric cable is intended to be earthed the voltage test between the outer conductor and earth is, for all ratings, 2,500 V at works, and 1,000 V when laid and jointed.

The cable is no longer required to be immersed in water for twenty-four hours prior to the application of the voltage test, The immersion serves no useful purpose, since modern impregnating compounds are so impervious to moisture that immersion for several weeks will not appreciably affect the insulation. The only justification for the immersion in water is that it enables a uniform temperature to be attained for the measurement of resistance.

There has been, in the past, no standard practice with regard to the colours of the cores of mains cables, but it is hoped that the recommendations will be adopted in new installations and in replacements, so that it may eventually be possible to formulate definite standards. In the new Specification the number of different colours has been reduced to three, namely, red, black, and "natural," and all the necessary combinations for cables with as many as six cores can be secured without confusion. The reason for the suppression of blue and green is that the action of impregnating compounds on paper of these colours is such as to render them more or less indistinguishable from each other, and from black.

The recommended colour scheme does not agree with that standardised for switchboard connections (B.S.S. No. 158) or for house-wiring cables (I.E.E. Regulations). It is impossible to devise a workable scheme which would be equally applicable to switchboards, mains cables and house-wiring cables, and there seems no real need for any such universal scheme. The only practicable point of co-ordination of the three schemes is in the adoption of black for the neutral.

The old Specification made no mention of any test to be applied to the galvanised armouring wires, and cable makers were often called upon by purchasers to apply tests, probably lifted from some other Specification, which were entirely unsuitable for the class of wire in question. A clearly defined galvanising test, which should prove effective, is now given in the Specification.

The Heston Air Port Clock. By T. R. Robinson

WHAT is perhaps the most novel electric clock of large size yet erected is the aerodrome clock, arranged for operation by synchronous electric motors, recently constructed by Synclocks, Ltd., for the Heston Air Port, and specially designed to give the time from the ground to the occupants of aeroplanes in flight. The horizontal dial is 14 ft. in diameter, and this large size, coupled with the fact that there is a large gravitational pull on the hands, has necessitated the adoption of many unusual constructional details. Chief amongst these is the cantilever design of the hands themselves, this being rendered necessary by the long overhang. The hands are made of sheet metal, and they are reinforced on the under-sides by a framework of light girders. The overhanging pull of the hands is converted to a simple downward thrust at the spindles and this, in turn, is taken by a pair of thrust ball races which take the weight of the hour and minute hands independently.

The Motor and Gearing

The clock movement itself is particularly compact, being housed in a metal case in the centre of the dial and measuring 15 by 8 by 6 in. The actual operation of the clock is by two "C" type Synclock motors, which are coupled in tandem, thus sharing the load of the hands between them. Each motor has its own independent reduction gearing, each gear unit being provided with its sealed oil bath. One of the motors is shown in the accompanying illustration, which indicates its very small size. The enclosed reduction gear is contained in the circular casing and gives a speed of one revolution per minute to the spindle, which can be seen projecting from the lower part of the casing, and it is therefore necessary to provide a further 60 to 1 reduction between these spindles and the hands of the clock. This secondary reduction gear consists of wheels and pinions of the spur type and, as well as providing the necessary speed reduction, it also serves to couple the driving effort of the two motors.

The Heston Air Port clock

To ensure that the oil baths of the two primary reduction gears shall provide maximum lubrication the spindles of the motors and gears are kept horizontal, and this form of construction entailed the employment of bevel gears to transmit the drive to the vertical spindles of the hands. The "spiral-bevel" form of gear was used for the dual objects of eliminating backlash and ensuring smooth meshing of the gears. The whole of the mechanism, comprising the two motors with their self-contained reduction gearing, the secondary reduction gear and bevel gearing, and the ball bearings for the spindles of the hands, is contained in the small metal case situated at the dial centre, and the dimensions of this give a good idea of the compactness of this form of electrically operated movement. However, despite its small size, the mechanism is far from under-powered, for each of the motors develops 0.8 in.-pound, thus giving a total of 1.6 in.-pounds, which is more than sufficient to drive the hands through all weathers.

The compact driving unit

Special care has been taken to render the metal casing around the movement weatherproof. The movement is mounted upon a concrete foundation and is secured in place by bolts. A very sturdy method of fixing was essential, for the leverage exerted by the long overhang of the hands is an important consideration. The dial of the clock is of cement and slopes from the centre to the edge for drainage purposes. Around the edge of the dial is a raised ring upon which appear the numerals, the ring being increased in width at the point where the figure "12" appears in order to enable the time to be read with ease. The unmistakable type of Arabic numeral employed, white on a dark background, is very clear and distinct. To make them as distinctive as possible, the hour hand has a spear-shaped tip and the minute hand an elongated triangular plate which is arranged to come exactly over the figure ring.

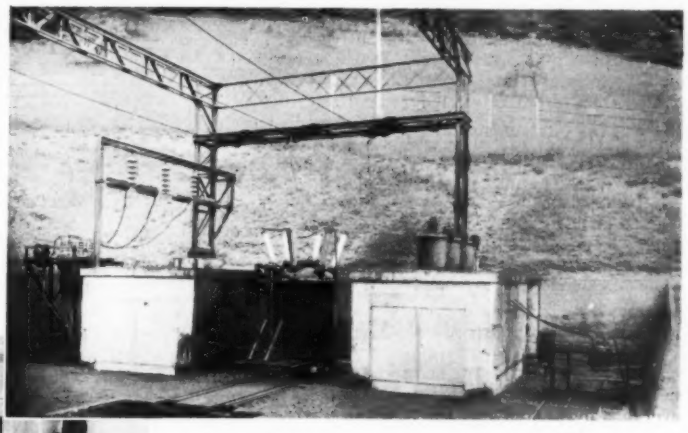
The motors are the high-speed self-starting type, being practically identical in construction with the small motors used by Synclocks, Ltd., for their domestic clocks. The only real difference is that of size. The electricity for the operation of the Heston clock is drawn from the normal supply mains of the aerodrome, and is frequency-controlled. There being no master-clock, batteries, or other fittings, the clock is completely self-maintaining and requires no attention from the staff of the aerodrome.

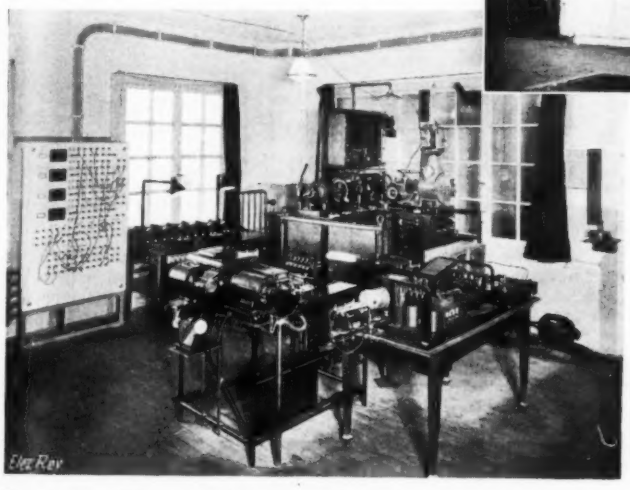
A Large High-voltage Testing Installation

A 300-ton twelve-pole alternator

EVEN in its present state of development with only one generator, the high-voltage testing plant which has recently been installed at the works of the Brown Boveri Co., at Baden, Switzerland, is claimed to be one of the largest in the world. The plant consists, at present, of a three-phase alternator of high short-circuit output, a transformer for producing high test voltages, 11-kV distribution bus-bars with reactors, and the circuit breaker test-bays. During a short-circuit, heavy shocks are transmitted to the base-plate from the stator of the machine, which made necessary foundations 16½ ft. deep, consisting of 800 tons of reinforced concrete.

The alternator has a total weight of 300 tons, runs at 500 r.p.m., and has twelve poles. The ratio of rotor to stator copper is about 3.5 to 1. The rotor weighs 120 tons, and is cylindrical. The stator windings are designed for 6.4 kV per phase, and can be connected either in star or delta. The separately driven exciter can be used either as a shunt or series machine. The alternator is directly coupled to an induction motor with an output of 2,200 kW at 8 kV, and the driving motor is provided with a flywheel in order to enable it to withstand sudden increases in load. The set is started in about three minutes, taking from 2,000 to 3,000 kW. During short-circuits, the high load peaks are covered by the energy contained in the rotating masses. The motor is also used as a brake to stop the set quickly. The operation of the motor switch, the reversing switch, and the liquid starter can be carried out from the main control desk.





Above: The test bays and cubicles. Left: The control room and oscillograph equipment

Heavy Currents

The 85,000 kVA transformer has double concentric windings and the maximum current can attain 180,000 A on the low-voltage side. The windings are divided into sections, and by changing the connections different voltages can be obtained as required, besides single-phase voltages. All switching operations on the windings are carried out outside the tank. From the high-voltage terminals an overhead line suspended from chains of insulators passes through bushing-type current transformers to the circuit breaker test beds which are out of doors.

The alternator can be connected directly to the test-bays or the transformer through the reactors. The bus-bars are held together by cross supporting pieces, and the reactors, of which there are three per phase, can either be connected in series or in parallel as desired. The three-phase cables installed had to be very carefully chosen to avoid conductor displacement inside the cable; mechanical resistance was obtained by special armouring in lead covering. Six cables, each with a section of 3 by 350 sq. mm., are connected in parallel.

The three test-bays are open pits cut out of the natural slope of the land. Each is provided with rails for running the circuit breakers on trucks to and from the bays. The test object is kept under observation during test from the control-room at a distance of some 100 ft. Each of the test-bays is provided with connections for compressed air and for three-phase supply at 380 V, and also with pipes by which oil can be drawn from, or pumped back to, an oil storage plant. The greater part of the energy for operating the plant comes from the 8-kV system of the Aargau electricity works, and for tests requiring only fairly small powers, the 8-kV supply system can be used directly as a source of power. There is also a special set, consisting of one motor and four d.c. generators, which serves to supply energy to the remote-controlled operating motors of breakers under test, illumination for cinematographic exposures, and other auxiliary services.

The Recording Apparatus

In order to record all phenomena occurring during the tests, the control-room is provided with several oscillographs, including instruments with as many as six elements. The opening of the oscillograph shutters is controlled by auxiliary contacts mounted on the circuit-breaker spindle energy released during an interruption can be calculated the oscillograms or measured directly by means of b wattmeters. The movement of the contacts during the operation of a circuit breaker is recorded by an oscillograph, for which purpose contacts of given width and spacing, mounted on the breaker spindle in a similar way to a commutator, are used. For the measurement of the pressure a membrane is employed, the movement of which alters the reluctance of an iron core excited by a current at a constant frequency of 1,000 cycles. The variation of the reluctance causes a corresponding variation in the e.m.f. induced in a secondary winding. Since the movement of the membrane is proportional to the pressure, the variations of the latter can be determined from the variations of e.m.f. in the secondary winding. For slow-motion cinematography a camera with which up to 1,500 exposures per second can be made is available. With this frequency of exposure, phenomena can be reproduced by a normal cinematograph projector with a time magnification of from 100 to 150.

Electric Hydrogen-ion Apparatus

THE Palo-Myers concern of New York has developed a new electric hydrogen-ion apparatus for determining acidity which is applicable to electro-plating solutions, such as chromium, nickel, &c. Some of the advantages claimed for this new instrument are as follows: (1) Long-distance control by wires; (2) no polarisation; (3) satisfactory with almost any type of electrode; (4) no time lag in action of indicator; (5) elimination of resistance effect in the cell and lead wires; (6) measures any pH from 0 to 14; (7) direct readings without calculations; (8) will operate a relay for control purposes; (9) simple to operate; (10) if electrodes are placed in tanks or vats in the plant and connected by wire to the indicator, the acidity or alkalinity of the contents of the tanks or vats can be read off on the indicator situated in the laboratory or other convenient place. The instrument should be installed near the electrodes and away from machinery which causes either electrical interference or heavy vibration. Once the instrument is connected to the batteries and electrodes it is not necessary to disconnect it when it is not in use, as no current is then drawn from batteries or electrodes. If the instrument is correctly adjusted, the pH readings should be reproducible, and the meter readings should be steady. Unsteady or erratic readings are usually due to trouble with the electrodes, to open circuits, or to the use of solutions of extremely low conductivity. For this reason pH readings usually cannot be taken for oils or non-aqueous solutions.

Novel Switching Arrangements

How supply is maintained during inspection in a London sub-station

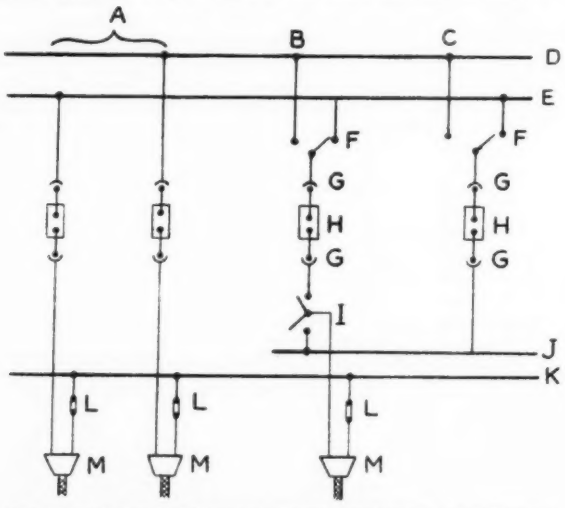
ARISING out of a suggestion by Mr. Cobham of the London Electric Supply Corporation, Ltd., new switchgear at the undertaking's Trafalgar Square sub-station is so arranged that the supply can be maintained to an outgoing feeder cable, even though the oil-immersed circuit breaker controlling the corresponding feeder cable is isolated for inspection. The switchgear was designed and manufactured by J. A. Statter & Co., Ltd., and it is believed to be the first armourclad vertical draw-out switchgear in which such switching has been incorporated.

The switchboard is made up of one busbar potential transformer, four transformer control, seven outgoing feeder, and one transfer units. The transformer units control the secondary side of banks of Scott-connected transformers (6.6 kV to 2,625 V), and are connected respectively to "A" and "B" phase busbars. Outgoing feeders each have a selector switch by which the feeder can be connected to either phase, and this switch is interlocked with the oil switch so that a change-over can only be effected when the oil switch is open. A change-over switch of the make-before-break type is also incorporated in the units for transferring the outgoing feeder cable to the transfer busbar and oil switch. The transfer switch unit is provided with a busbar selector switch only, and is connected to the transfer busbar.

To inspect any particular feeder oil switch and still maintain the supply on the feeder it is only necessary to place the selector switch on to whichever phase is supplying the feeder it is desired to examine, close the transfer oil switch, and change-over the make-before-break switch on the outgoing feeder unit, so that the feeder cable (which is fed and protected by the transfer oil switch) is connected to the transfer busbar. The switch can then be tripped and withdrawn for examination. On each unit is a plug connected by a flexible lead to an auxiliary switch which is closed when the breaker is opened, and by a system of pilot wires suitable audible and visible signals are given in the main distribution sub-station.

A Compact Switchboard

The switchboard is built up from the makers' recently introduced type "S" single-phase armourclad vertical draw-out switch pillars modified to provide the particular switching operations. The pillars are very compact with centres of only 13 in., and the equipment is suitable for use on single-phase systems at up to 3,300 V and 800-A carrying capacity.



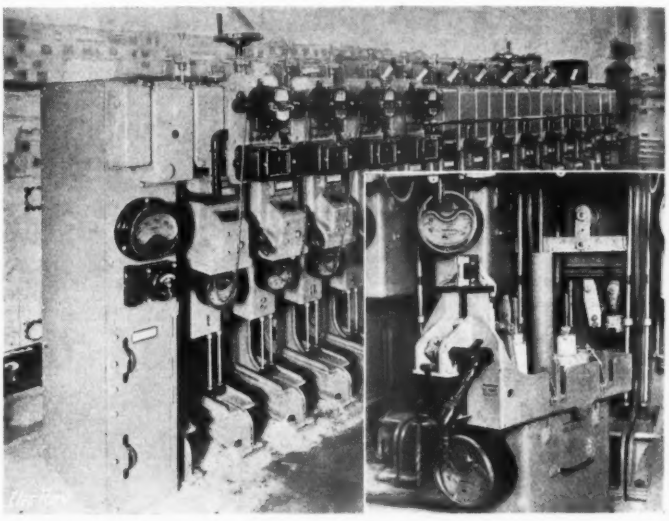
Arrangements for isolating the circuit breaker and maintaining the supply on the corresponding cable

A. transformer units; B. outgoing feeder unit; C. transfer unit; D. phase "A" busbar; E. phase "B" busbar; F. change-over selection switches; G. isolating plugs and sockets; H. oil circuit breakers; I. transfer change-over switch; J. transfer busbar; K. outer (earthed) busbar; L. outer links; M. cable sealing boxes.

A central lifting screw operated by a handwheel at the top of each switch pillar is employed for isolating the oil switch carriage. To remove the tank the carriage has to be lowered to its extreme position before the nuts securing the tank to the top plate may be released. In this position also the complete oil switch carriage may be removed by moving a slide casting (situated below the handwheel to the left) and continuing to turn the handwheel. The usual interlocking arrangements are incorporated.

The Busbar Chamber

In a compound-filled chamber at the top of the switch pillar is fitted the inner busbar, and split connection chambers are provided for readily coupling up the units. The outer or earthed busbar is air insulated and mounted on a porcelain insulator behind the oil switch. The outer conductor and the concentric cable is taken through the cable box and is connected to the outer busbar through a link situated behind the oil switch, so that it is only accessible when the switch carriage is lowered.



The new switchboard at the L.E.S. Corporation's Trafalgar Square sub-station; transformer units near camera. (Inset: Tank lowered and removed, showing construction and earth busbar and cable connections at back)

Bar primary current transformers can be fitted on the oil switch top plate, thus dispensing with auxiliary plugs, and wound primary current transformers can be fitted inside the stationary switch pillars, with the necessary auxiliary plugs mounted in accessible positions at the front. When a time-limit fuse is provided for shunting the overload trip coil this is fitted behind a hinged cover carrying a spare. Each unit is provided with mechanical "on" and "off" indicators, an oil baffle and vent, and a padlock for the oil switch operating handle. All parts likely to be subjected to eddy-current heating are fitted with non-magnetic surrounds.

False Economy Exposed

THE object of Philips Lamps, Ltd., Philips House, 145, Charing Cross Road, London, W.C.2, in introducing a portable photometer is to demonstrate to the trade and consumers the folly of using low-efficiency lamps. Demonstrators each equipped with one of the instruments are being employed continuously for such demonstrating work. Mr. J. H. Otten, of the company, recently stated that if an installation of a hundred 100-W high-efficiency lamps were replaced by lamps of 15 per cent. lower efficiency an extra eighteen would be required. Thus any saving in cost would probably be negatived by the expense of the extra electricity which the inferior lamps would necessitate.

The photometer incorporates a Philips 3510 vacuum photo-electric cell, the sensitivity of which is 3μA/lumen at 120 V. The maximum photo-electric effect is obtained at 5,400 angstrom. A "Miniwatt" E424 indirectly heated amplifying valve with a slope of mA/volt (amplification factor 24) is used. The instrument is suitable for either a.c. or d.c. operation. The voltage applied is maintained constant by a regulator lamp, and the amplifying valve thus operates under uniform conditions. A milliammeter indicates the luminous output in percentages, and a wattmeter measures the loading of the lamps. The light projected on the cell is regulated by an ordinary diaphragm, and the amplified current can be controlled at will by a potentiometer which modifies the polarisation of the grid. These two components make it possible to keep within the registering limits of the apparatus when testing lamps of high intensity.

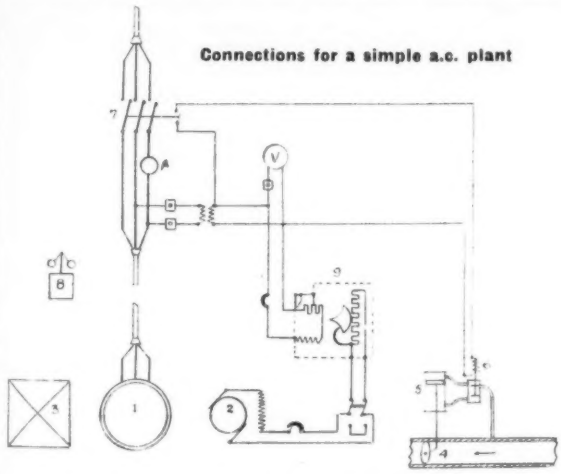
Automatic Hydro-electric Plants. By F. Johnstone Taylor

PELTON wheels can be equipped with very simple remote control devices. A plant of this class for operating the Town Mills, Hebden Bridge, was put down a few years ago by Messrs. Gilkes for driving a 68-kW generator transmitting d.c. overhead at 500 V. The turbine runs at 600 r.p.m. under a 450-ft. head and the mechanism for starting and stopping consists of a full way sluice valve, the spindle of which is extended and attached to a piston moving in a hydraulic cylinder. Pressure water from the pipe line is admitted to one or the other end of this cylinder by a small solenoid piston valve operated from the mill. Where hydraulic operation of the valve is impracticable, an electrically operated valve is a simple alternative.

The illustration on the right shows a scheme employed on several little plants in the western states of America. Small motors, indicated at A, open and close the main and subsidiary control valves through gearing, relays, and limit switches which prevent jamming and other abuse of the apparatus. A simpler arrangement is the type of valve which allows of the motor overrunning after it is closed and, alternatively, of its running up to speed before actual engagement with the valve spindle, thus providing momentum for "breaking" the valve; the Igranic Co. makes a speciality of this system.

Larger Plants: Francis Turbines

The control of the Pelton sets embodies an automatic telephone set and a buzzer indicating to the operator all the essential operating conditions at the remote station (*e.g.*, the head of water available). Although the automatic control starts the machinery at full gate opening, the operator can reduce the load to conform with the power available by dialling a number on the automatic telephone circuit; the buzzer will inform the operator that he has arranged for correct operation. Abnormal conditions will be indicated to the operator through a stentorphone.



Connections for a simple a.c. plant

A Francis turbine can be automatically operated, but as the guide vanes will not generally close dead tight a gate or stop valve must be operated independently of the governor motion, usually by the water pressure in the pipe line, the servo motor being controlled by a lifting coil. Then the turbine governor can be so adjusted that the gates are not closed further than will admit of the turbine restarting itself when the valve is opened.

The Advantages of Synchronous Generators

The installation of synchronous generators greatly simplifies the equipment by the elimination of the exciter and voltage regulators and, if the voltage is determined by the generators at the main station, the governor of the turbine can also be omitted or be of a very simple type.

The connections for a simple a.c. plant are shown diagrammatically. The alternator 1 with its direct coupled exciter 2 is started up by opening the control valve 4 actuated by the servo motor 5 which is controlled in such a manner by the electro-magnet switch 6 that when this is excited water under pressure enters the servo motor causing the valve to open. To start the set the attendant closes the alternator switch 7 and raises the lifting coil 6, thereby opening the sluice valve. The oil-controlled governor 8 and the voltage regulator 9 maintain the speed and voltage constant. The attendant may now release the lifting coil and the set may be left unattended. The alternator circuit breaker is usually provided with only over-current relays, and an auxiliary switch (mechanically operated by the circuit breaker) interrupts the lifting coil circuit, bringing the turbine to rest.

When a station is operated in parallel with others the transformer indicated at 2 in the layout of the control system provides power for the system, the master starting element being shown at 1. Presuming the various protective devices and the control power switch to be closed, the master control contactor 3 closes and energises the governor solenoid 4, which by opening the governor pilot valve puts the turbine in operation.

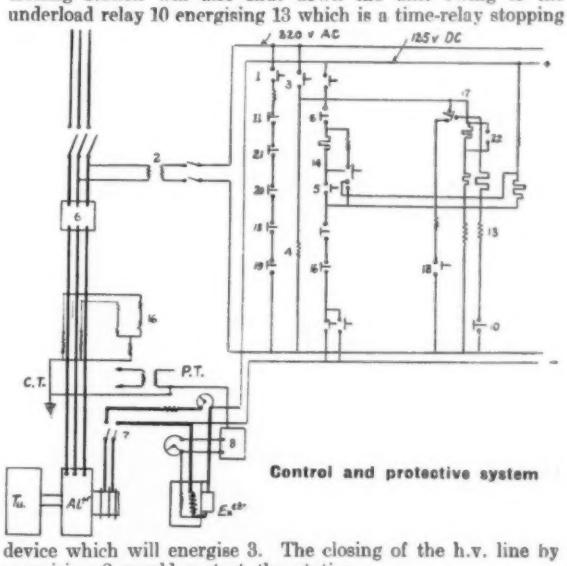
While the generator is being run up to speed, the exciter field rheostat is short circuited. When the set approaches

An automatically controlled turbine

synchronous speed, the speed control switch 5 closes, completing the circuit and closing the oil circuit breaker 6. The generator is thus connected to the line without field, but the closing of 6 also causes the field contactor 7 to close, and, the field being applied, the unit is pulled into step by the combined effect of a synchronising capacity and of the acceleration of the turbine to normal speed. The voltage regulator 8 determines the voltage to which the governor will build up, and the setting of the governor determines the load that the machine will take.

Shutting-down Methods

Closing down is effected by opening 3 and closing 1, the gates then being shut on the de-energising of the governor solenoid relay. A limit switch operated from the gates is so adjusted that when the latter reach a position which will reduce the load on the generator to a low value a circuit is completed which opens 6 and disconnects the unit from the line. At the same instant 7 opens, putting the station into the shut-down position. Opening the h.v. line in the controlling station will also shut down the unit owing to the underload relay 10 energising 13 which is a time-relay stopping



Control and protective system

device which will energise 3. The closing of the h.v. line by energising 2 would restart the station.

For providing protection, contactor 3 would be opened by the overspeed limit switch 12, though it will reclose on the

speed falling to a predetermined limit. Contactor 5 provides against underspeed as its contacts remain open until approximately 95 per cent. synchronous speed is reached. It completes the circuit to the exciter relay 14 and so precludes the unit being put on the line until it attains approximately synchronous speed. The overload relay indicated at 16 is connected to the current transformers in the power line and must be reset by hand. In the event of the field current failing, the field relay 7 is de-energised, and closes 18 (a time-delay auxiliary relay) which will open 1 and shut down the station till it is reset by hand. In the case of heated bearings 19 actuates 1. Relay 20 gives protection against overheated windings, 21 protects against over voltage, 22 against low oil pressure, and 23 against exciter over voltage.

Pre-heated Air for Boilers. By R. Livingstone

The economical size of air heater and the minimum flue-gas temperature

THE pre-heating of air for combustion results in economy in coal consumption and permits of a reduction in the grate area, combustion space, and heating surface of the boiler. It has sometimes been assumed that the increased maintenance charges for the stoker and combustion chamber would either counterbalance the reduction in capital charges for the boiler or entail a correspondingly higher cost of construction for the smaller surface. Recent experience with modern boilers having water-cooled walls does not support this assumption for moderate values of air heating.

Too high a combustion temperature causes trouble with the furnace refractories, particularly when the temperature exceeds the melting point of the ash. As the actual combustion temperature is less than the theoretical maximum on account of radiation, the combustion temperature depends on the proportion of the chamber walls which absorbs radiant heat—the "fraction cold." Not only does a high fraction cold result in a reduced combustion temperature when the air is not preheated, but the increase in combustion temperature with increase in air temperature is less with a large than with a small fraction cold. Thus, if the heat transmitted by radiation in one boiler is 35 per cent. of the total and 25 per cent. in another, the combustion temperature of the one with the higher fraction cold will be nearly 290 deg. F. lower than the other, and an increase of 100 deg. F. in air temperature will result in an increase of only 35 deg. F. in combustion temperature as against an increase of 45 deg. F. for the boiler with the smaller fraction cold.

The limit to the air temperature so far as the refractories are concerned depends on the construction of the combustion chamber and on the fraction cold. Where the whole of the walls are water-cooled, or screened, and any refractories exposed to the uncooled gases are specially designed, air temperatures of 500 to 600 deg. F. are possible.

With stoker-fired boilers, too high a grate temperature leads to combustion difficulties and to trouble with the stoker mechanism. When the grate is cooled by the incoming combustion air the grate temperature increases by the same amount as the air temperature. This imposes a limit to the air temperature which is appreciably less than the above, and any inlet air temperature higher than 350 deg. F. to 400 deg. F. involves a risk with the average volatile fuels and present-day mechanical stokers.

The Size of Air Heaters

Apart from the limit to the amount of preheating imposed by the safe combustion and stoker grate temperatures, there is an economic limit to the size of the air heater which depends on the capital charges of the latter, the annual saving in the cost of fuel, and the reduction in the boiler capital charges. The economic amount of preheating gives air temperatures very much lower than even 350 deg. F.

Taking an average quality of coal with an ultimate analysis of: Moisture (as fired), 10 per cent.; carbon, 64.2; hydrogen, 4.4; oxygen, 8.0; nitrogen, &c., 2.4; ash, 11.0; total, 100.0; and having a gross calorific value (as fired) of 11,500 B.th.u. per lb., the flue gases weigh 13.85 lb. per lb. of coal and have a specific heat of 0.249 with average CO_2 of 12 per cent. Above 212 deg. F. the recoverable heat from the flue gases is 3.45 B.th.u. per deg. F. Allowing for a small amount of infiltration, the corresponding weight of air passing through the heater is 12.9 lb. per lb. of fuel with a specific heat of 0.24. For an increase in air temperature of x deg. F., the required surface of air heater in sq. ft. per lb. of fuel at normal economic rating is $S=3.105x/r(T-0.95x)$, when T is the flue-gas temperature leaving the economiser less air temperature at inlet to heater in deg. F. and r is the coefficient of heat transmission of the air heater.

The cost of an air heater can usually be divided into two portions, one a constant per lb. of fuel at n.e.r., and the other proportional to the actual surface of the heater. The fixed portion comprises the cost of ducts, dampers, and part of the heater casing, and the variable portion the remainder of the heater casing and the heating surface itself. If building or other structural alterations are necessary their cost should be included. The complete cost in shillings per lb. of fuel at n.e.r. can then be expressed as $a+bs$.

The annual saving in the cost of fuel in shillings per lb. at n.e.r. is $0.105\,lcx/100$, when any saving due to improved combustion with hot air is neglected, *i.e.*, the saving is taken as due to the reduction in flue-gas losses only, l is the utilisation factor of the boiler and for all practical purposes can be taken as the annual coal consumption divided by the total consumption of all boilers at n.e.r. $\times 8760$. The value c is the cost of coal as fired in shillings per ton.

Assuming that the reduction in capital charges for the boiler is proportional to the amount of air preheating and equal to yx, the value of y can be found for average conditions by estimating the change in heat transmission of a boiler with a given increase in air temperature constant exit flue-gas temperature and constant rates of heat transmission for radiant and convected heat.

The average reduction in heating surface is about 2½ per cent. per 100 deg. F. increase in air temperature, and the fuel consumption is reduced by about 2.7 per cent. with constant combustion efficiency. If the capital charges are taken at 10 per cent. per annum, the cost of increasing the size of stoker, boiler, and a share of the buildings as £1 per sq. ft and the normal boiler surface as 1½ sq. ft. per lb. of fuel at n.e.r., then $y=0.075/100$ as a good average.

Economical Limit to Air Preheating

The use of an air heater adds to the power consumption of the fans and to the annual cost of cleaning. If the capital charges on the heater are taken at 12 per cent. per annum it should allow for the increase in maintenance with increase in surface with sufficient margin to cover the increase in power consumption. When the coal saving, reduction in boiler capital charges, and increase in heater capital charges are tabulated for increasing values of air preheating x it will be found that there is a value of x which gives the greatest annual saving. It can be shown that this value is:

$$x = 1{\cdot}05\left(T - 18{\cdot}8\sqrt{\frac{bT}{r(lc+950y)}}\right)$$

In certain circumstances the value of x is zero and a heater is not economical. In addition to this the sum of the coal saving and reduction in capital charges on the boiler must be greater than the total capital charges on the heater. Taking the average values of the various factors as: Load factor $l=0.35$, coal cost $c=13$s. per ton, heater cost per lb. of fuel at n.e.r. $a+bs=2.5+5s$, rate of heat transmission $r=2.5$ B.th.u. per sq. ft. per hour for each deg. F., and $y=0.075/100$, it will be found that a heater is not economical when the temperature of the flue-gases leaving the economiser is less than 440 deg. F., that the economic increase in inlet air of 80 deg. F. is 145 deg. F., and that the minimum economical exit gas temperature from the heater is 310 deg. F. for this temperature at the economiser exit.

With higher economiser gas exit temperatures the degree of preheating should be greater and the final gas exit temperature higher. It would therefore appear that final flue-gas temperatures of less than 300 deg. F. are not economical unless (1) the increment cost per sq. ft. of heater÷the rate of heat transmission is less than 2, or (2) the load factor×the cost of coal in shillings per ton is greater than 4.55.

Architectural Lighting

Four years have elapsed since the last edition of the handbook on architectural lighting was issued by the Lighting Service Bureau. Since then progress in the use of light as a decorative (as distinct from a utilitarian) medium has been very rapid in Great Britain. This is shown in the large number of representative British examples of decorative lighting based upon the fulfilment of practical functions included in the new handbook, No. 8A (60 pp.). The technical section has been completely revised to deal with the most modern practice, *e.g.*, spacing, temperature rise, and acoustics. There should be a big demand for this well-produced and thoroughly practical little book from architects as well as from illumination engineers. Copies may be obtained free of charge from the Lighting Service Bureau, 2, Savoy Hill, W.C.2.

An Electrified Steel Mill

SIR ANDREW DUNCAN, chairman of the Central Electricity Board, inaugurated the electric drive of the slabbing and blooming mill at the Dalzell Steel and Iron Works, Motherwell, of Colvilles, Ltd., on March 31st. The mill has been converted to electric drive, and, as part of the reconstruction scheme, the whole of the transmission between driving motor and mill rolls has been redesigned, the component parts having been manufactured in the company's extensive engineering shops.

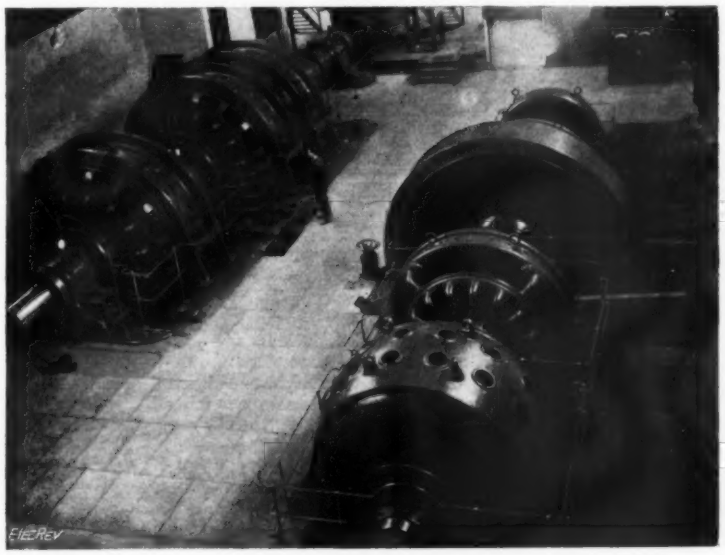
A noteworthy feature is a shaft for transmitting motion to the upper mill roll, approximately 22 ft. long, which is provided with universal ends which permit of the shaft operating noiselessly over its full range of inclination from the horizontal. Ingots are carried from the heating pits to the mill by motor-operated roller-feed tables, similar equipment being provided for delivering the rolled products from the mill to the hot shear and finally to the point of disposal.

The large electric motor, which is directly coupled to the mill, is designed to give a torque of 225 metre-tons at any speed from 0-60 r.p.m., the corresponding horse power at the latter speed being 19,000. A further speed range at constant horse power is available between the limits of 60 and 150 r.p.m. The weight of the motor is 325 tons, and the shaft diameter is 25 in. The control of the motor is on the Ward Leonard principle.

Auxiliaries comprise a bank of transformers for converting the incoming Clyde Valley supply at 11,000 V down to 3,3000 V, at which pressure the motors of the flywheel set and the exciter set are fed, and a bank of 3,300-V condensers for improving the power factor of the system, &c.

Mr. John Craig, chairman of the company, who presided at the inauguration, said that the change from steam to electricity was significant. Their works were originally laid down because of their proximity to an abundant coal supply. Since that time more than sixty years ago, they had become aware of the natural exhaustion which had taken place in that coal area, and it looked for a time as if the reason for having steel and iron works in Lanarkshire might pass away. Happily, electric power was being made available to take the place of the lessened supplies of fuel. It appeared to him that the authorities would be justified in offering electricity at a very low price, even though the price did not fully cover all the costs. They were living in an age when many uneconomic things were being done, and he ventured to express the idea that a very substantial reduction in the cost of electricity in existing industrial areas would be of great assistance in bringing about a revival in the older industries.

Sir Andrew Duncan remarked that in a country so essentially industrial as Scotland it must be to the common advantage that the average cost of electricity supply for industrial purposes should be lessening, as it had been in a very marked way. The very best means of helping and hastening the downward trend in the price of industrial supplies of electricity was to concentrate industrial requirements on the public system, just as within the electricity supply industry they were concentrating the requirements of the supply industry itself. There was no ordinary straightforward industrial case in which private plant—if properly costed—could produce more cheaply than the public supply, and every unnecessary private plant installed was a disservice to industrial interests. It might be possible for electricity supply to co-operate closely and helpfully with industrialists who were seeking by the establishment of new processes to open up fresh fields of employment and activity.



A view of the new Dalzell plant

The Determination of Neutral Currents

WHERE a three-phase supply is given on a four-wire system it is often necessary to determine the current in the neutral conductor. Provision is never made for measuring this current with permanent instruments, and most installation supervisors are quite rightly opposed to the provision of links for the insertion of portable instruments in neutral leads. When the phase currents and their relative power factors are known, simple geometry will determine the neutral current. Facilities for draughting are not always available, and a mathematical formula is not a handy field device when angle quantities are involved.

When I was faced with the solution of a long series of these problems I prepared the graphical chart in fig. 2 on the vector basis in fig. 1. As nearly all problems of this nature arise from heating appliances, the power factors are taken as unity for the three phases. When the phase currents are known, the largest is chosen for the A vector to a scale of 1.0, and B/A and C/A are laid off at 60 deg. along AB′ and AC′. These are reflections of the current vectors NB and NC so placed as to give the ends of resultants directly. The vector resultant of phase currents A and B will always be between N and some point on AB′ and will be a scalar representation of the current RAB/A. A further parallelogram construction using the vector C/A in combination with the resultant vector RAB/A will give the neutral current vector as a ratio N/A, where N is the current in the neutral. This vector is shown as $I_N - N$.

From this construction the general principle of the chart in fig. 2 can be obtained. From the scales B/A, C/A, intercepting lines parallel to B′N and C′N are drawn, the points of interception giving the ends of the vectors of the neutral currents. The length of the neutral vector can be read on a rotating scale about N as centre or along circular graduations as shown. The ratio N/A multiplied by the original value of A in amperes will thus give the neutral current in amperes.—J. E. HOWARD, B.E. (N.Z.).

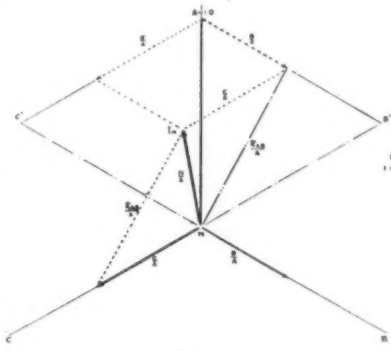


Fig. 1

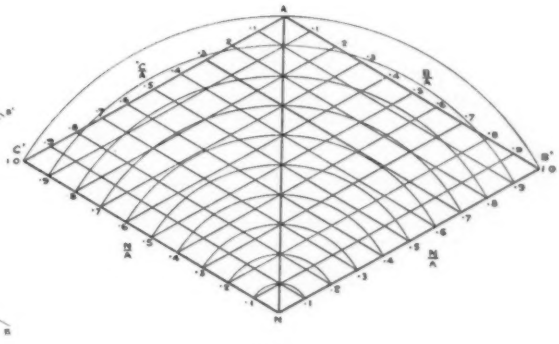


Fig. 2

Remote Control and Indication

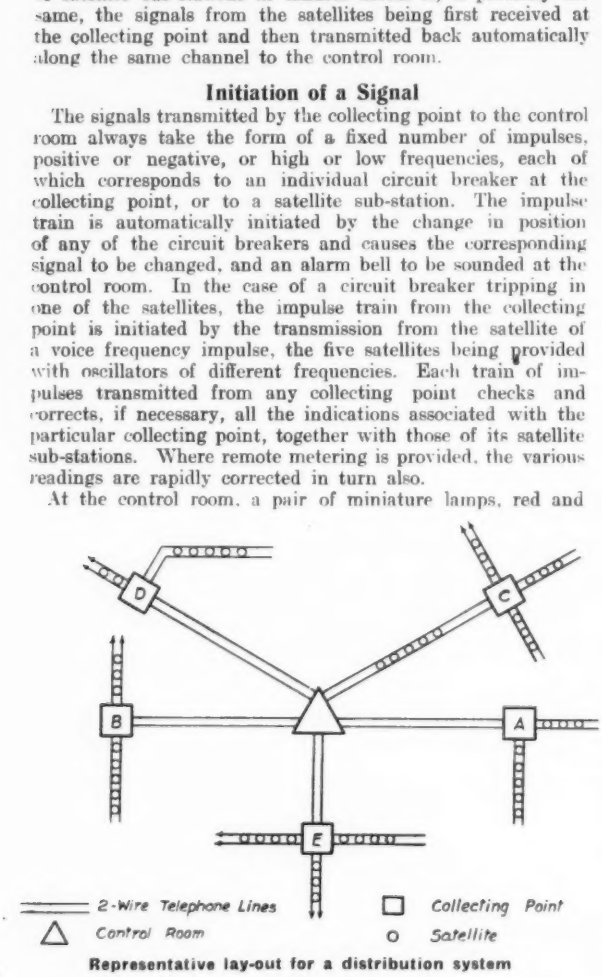
A SCHEME has been developed whereby the advantages afforded by A.T.M. Strowger supervisory remote control can be secured for existing power networks, whilst providing for future growth and extensions. This plan is applicable where there is a large number of small unattended distribution point sub-stations already interconnected by telephone lines, which the scheme utilises without in any way impairing the telephone facilities. Referring to the accompanying lay-out, the satellite sub-stations transmit their signals to the central control room *via* larger sub-stations, termed collecting points. Each collecting point and its associated satellite sub-stations may be regarded as an independent unit, the number of which can be increased indefinitely. As many as five satellite sub-stations can be connected to the same telephone pair on this particular scheme.

The following is a summary of the facilities provided in the typical network under consideration: automatic position indications of individual collecting point circuit breakers; automatic indications of "satellite" sub-stations at which a circuit breaker has tripped; remote selection, "closing" and "tripping" of collecting point circuit breakers; remote metering of "collecting point" sub-station meters; telephone communication between control room and any sub-station; checking and exercising equipment; and repeat signal facilities. Operation for collecting point "C," which has also a number of satellite sub-stations in tandem across it, is precisely the same, the signals from the satellites being first received at the collecting point and then transmitted back automatically along the same channel to the control room.

Initiation of a Signal

The signals transmitted by the collecting point to the control room always take the form of a fixed number of impulses, positive or negative, or high or low frequencies, each of which corresponds to an individual circuit breaker at the collecting point, or to a satellite sub-station. The impulse train is automatically initiated by the change in position of any of the circuit breakers and causes the corresponding signal to be changed, and an alarm bell to be sounded at the control room. In the case of a circuit breaker tripping in one of the satellites, the impulse train from the collecting point is initiated by the transmission from the satellite of a voice frequency impulse, the five satellites being provided with oscillators of different frequencies. Each train of impulses transmitted from any collecting point checks and corrects, if necessary, all the indications associated with the particular collecting point, together with those of its satellite sub-stations. Where remote metering is provided, the various readings are rapidly corrected in turn also.

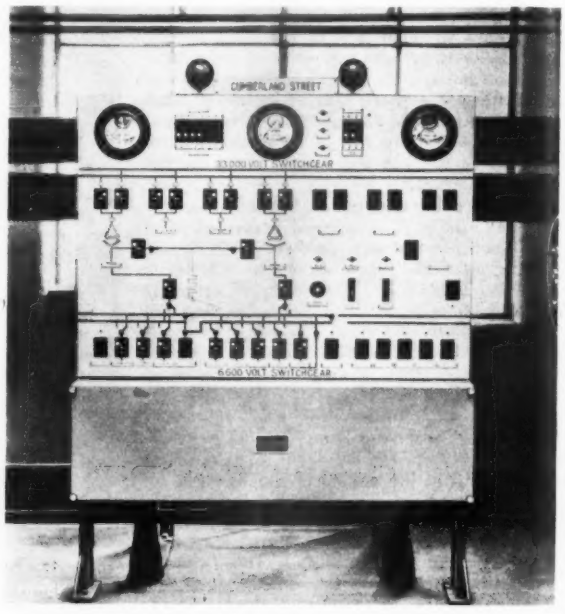
At the control room, a pair of miniature lamps, red and



Representative lay-out for a distribution system

green, and a locking push-button are associated with each distant circuit breaker to be remotely controlled. In order to "close" or "trip" any particular circuit breaker, the associated push-button is first actuated and locked to effect the desired "selection" at the collecting point. Upon completion of the selective operation, a signal is automatically transmitted back to the control room and causes a common lamp to glow, thus "proving" the selection. The engineer then momentarily depresses one or other of the common "operating" keys, one to "close," the other to "trip" the selected breaker. When the change in position occurs, a train of impulses is transmitted from the collecting point to the control room, where the signal associated with the breaker just operated is caused to change over and flicker. The momentary operation of the reset key causes the flicker to cease and the signal lamp to glow steadily.

At the collecting point, one uniselector is first stepped by impulses of one polarity, and the second uniselector is stepped a complementary number of times by impulses of the opposite polarity. Provided both uniselectors step correctly, the selecting circuit is completed and a signal is automatically transmitted back to the control room to "prove" the selection. If, due to inductive interference from a surge, or other effect, the impulse train is distorted, causing either of the uni-



Installation for remote control and indication of circuit breakers at distant sub-stations

selectors to step incorrectly, the selective operation must be repeated. An "in and out or fault" indication is given in the event of a circuit breaker tripping, due to the persistence of a fault, immediately it has been "closed" by the operating key.

Meter Reading Transmissions

For transmitting meter readings from the collecting points to the control room impulses controlled by a simple robust transmitter incorporated in each meter whose readings are required are employed. The number of impulses received by the mechanical meter, and therefore the position finally attained by its pointer, is controlled by the transmitter, the contact arm of which occupies a position corresponding to the reading of the meter to which it is attached. Remote metering is very rapidly accomplished.

The oscillators in the satellite sub-station are tuned to five different frequencies. The output from the oscillator is connected through an output transformer and a filter unit, ensuring that only the frequency associated with the particular station is transmitted. In the event of circuit breakers being tripped simultaneously in more than one satellite, the various frequencies are superimposed one upon the other, and all the corresponding signals are corrected accordingly at the control room.

The World Power Conference

BULLETIN No. 4, published by the Organising Committee of this year's sectional meeting of the World Power Conference, contains the final programme. The arrangements have undergone slight modification from those originally announced. The opening reception takes place in Copenhagen on June 26th, 1933, and the official opening in Stockholm on June 28th; all the technical sessions will be held in Stockholm. The Norwegian part of the programme begins on July 7th, and the final proceedings in connection with the Conference will take place in Oslo on July 8th. Copies of the bulletin may be obtained from the British National Committee of the World Power Conference, 63, Lincoln's Inn Fields, W.C.2, which is also able to supply forms of application for membership of the Conference. Arrangements have been made for the collection by the British National Committee of these forms, together with the membership fee (£2 15s. for full membership, and £1 5s. for others accompanying members but not proposing to attend the Technical Sessions). Information regarding travel arrangements and hotel accommodation is being supplied on application.

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

Electric Trolley Buses Approved

In the discussion on electric trolley omnibuses at the joint meeting of the Institution of Electrical Engineers and the Institute of Transport in London on April 10th (Mr. C. J. Spencer's paper was referred to last week), Mr. F. W. Purse remarked that as a Wimbledon resident he could testify to the smooth running and popularity of these vehicles. Incidentally, the London and Home Counties J.E.A. (of which Mr. Purse is chief engineer) and the traction company had come to a satisfactory agreement regarding the price of electricity. In 1913 he had reported upon and recommended the adoption of a nine-mile trolley bus service in Watford. The system had a future, but its use must be regulated, as it was not applicable in all circumstances. He considered it disastrous that so much imported oil was being used. Electric vehicles consumed a product of British coal, and regard should be paid to that aspect of the subject.

Sir Joseph Nall thought that trolley buses might better be described as the operator's best hope rather than the tramwayman's last hope. Future expansion of the system was to be expected, and it could be expedited by the removal of legal difficulties. There was no longer any technical obstacle, and he hoped that something would be done soon to relieve the operator of the handicaps which now burdened him. In any case, when a tramway was abandoned the roadway had to be reinstated and new vehicles of one sort or another had to be purchased, so that the cost of conversion was not really a formidable snag and it must not be allowed to discourage.

Mr. C. Owen Silvers referred to early types of vehicles and motor drive arrangements, observing that the saving claimed for the diverted field motor was much the same as he obtained in Wolverhampton with regenerative motors. The use of radio chokes on the tops of vehicles was not desirable. Interference should be tackled in another way; for instance, by reducing the number of electrical auxiliaries on a bus, avoiding defective lampholders, &c. If electricity had been obtainable for tramways at a more reasonable price, fewer buses would have been on the roads to-day.

Mr. W. A. Stevens could not agree that the series-wound motor was the best, and spoke at length in favour of regenerative compounding and its advantages. Mr. H. A. Tripp said that from the traffic and operation point of view the change had been in conditions on the road rather than in public preference. Trolley buses enjoyed all the advantages of tramcars and petrol buses without their defects, apart from being tied to particular routes by their overhead collecting gear. They must have a great future, but many of their advantages would be lost if individual vehicles were made too large.

Mr. J. M. Calder pointed out that the burden imposed on operators by the Road Traffic Act was lighter in the case of trolley buses than of petrol buses. The overhead trolley pole system needed improving. Mr. A. L. Lunn asked for due consideration to be given to the fact that the adoption of trolley buses would provide work for British coal miners, electrical concerns, and vehicle builders. The supersession of electric street or road traction by petrol vehicles would be a national loss.

Mr. J. G. Griffin remarked that the author's current consumption figure per car mile seemed too high. The Italian system was very smooth running; pole exchanging was surely only necessary on single lines. Col. A. H. L. Mount referred to the weight and dimensions of the author's seventy-four-seater trolley bus.

The author reserved his reply.

One of the new 74-seater "A.E.C.-English Electric" buses of the London United Tramways

The Heating of Lamp Fittings and Connectors

The results of an investigation of the temperature-rise of domestic pendant lighting fittings and their connecting leads are outlined in a paper of more than usual interest by Messrs. P. D. Morgan, H. G. Taylor, and W. Lethersich, which was read at the Institution of Electrical Engineers in London on April 20th.

The problem is of considerable importance and valuable suggestions, which are capable of adoption in practice without much trouble or delay, are made for reducing heating values to safe limits.

The insulation of connecting leads to lampholders in which gas-filled lamps are used is liable to deterioration in the form of hardening and embrittlement of the rubber which, on slight disturbance, may crack off and expose the bare conductor. This usually occurs inside or within a few inches of the top of the holder and gives rise to the risk of a short-circuit and the possible burning of the flexible or other connecting lead, and also to the possibility of the holder, if it is a metal one, becoming alive. The deterioration of the rubber is due to its oxidisation, which is accelerated by the presence of heat. If the operating temperature is less than about 50 deg. C. the rate of deterioration is very slow, but above this it is more rapid. There is no sudden change point, but this is the maximum safe temperature for continuous operation.

Heat-resisting Flexible Cords

An obvious solution of this problem is to use connecting leads insulated with some material capable of withstanding a higher working temperature than 50 deg. C., and flexible cords of this description are available and are being used in dry situations. This solution has been adopted in America, but at present involves the use of a conductor the insulation resistance of which is much lower than that of rubber. The possibility of using rubber capable of operating at a higher temperature has been receiving the attention of the Cable Makers' Association, and as a result the E.R.A. has been advised that it would be possible to supply an improved type of rubber-insulated flexible cord which would give satisfactory operation at 60 deg. C. for a reasonable life under reasonable usage.

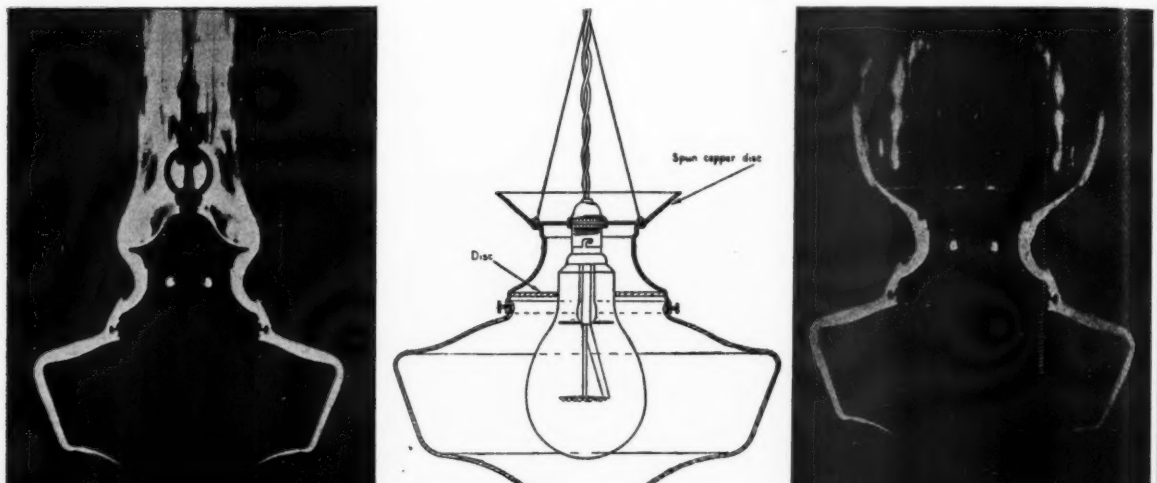
Daylight lamps cause slightly higher temperatures in the fittings than plain lamps, on account of the increased absorption of the glass. There is no very marked difference between the temperature-rise in ventilated and unventilated fittings. The maximum temperature of the connecting leads varies from about 40 deg. to 80 deg. C. at 1 in. from the end of the insulation, so that the maximum permissible temperature for rubber insulation, *viz.*, 48.8 deg. C. for long periods, or 54.4 deg. C. for a short period, is exceeded in the majority of cases.

Means of Averting the Trouble

The principal conclusions are as follows:—In practically all domestic pendant lamp fittings up to 200 W the temperature-rise of the connecting leads at ¼ in. from the terminal is in excess of the maximum permissible, *viz.*, 23.4 deg. C. For fittings in which the lamp hangs normally, the temperature-rise attains this value at points varying from 2¼ in. to 9 in. from the terminal. At the terminal the value varies from 51 to 117.5 deg. C. for the fittings tested. The temperature-rise with the open-bowl type fitting is lower than that with the conical shade, which in turn is lower than that with the enclosed bowl and canopy type of fitting. A lampholder (and its connecting leads) receives heat by conduction, through the cap, from the hot gas in the lamp; it dissipates heat by radiation and convection. In order to reduce its temperature to the minimum, the amount of heat conducted through the cap should be reduced and the dissipation of heat from its surface should be facilitated.

These results may be attained in the following ways, which

have been shown experimentally to be effective:—(i) By the use of a mica disc in the lamp neck; (ii) by the use of a non-metallic material for the lamp cap; (iii) by the provision of an evacuated space between the gasfilled bulb and the cap; (iv) by the use of a non-metallic material for the lampholder; (v) by preventing the direct access to the holder of the hot air which arises from the lamp, either by deflecting it away or by mixing it with cool air, by suitably shaping the lampholder; (vi) by increasing the radiation emissivity of the holder; (vii) by increasing the surface area of the holder; and (viii) by increasing the size of the lamp.



Left: The convection current distribution round a 12-in. enclosed bowl fitting. Centre: The fitting as modified. Right: The result of the modification upon convection current distribution

By the application of some or all of these modifications and practical developments of them it has been possible to reduce the temperature-rise of all pendant fittings tested to a safe value at ⅛ in. from the end of the insulation. Thus the conical shade may be reduced from 57.5 to 17.5 deg. C., the open bowl from 48.5 to 15 deg. C., and the enclosed bowl fitting from 83.5 to 15.5 deg. C., but such reductions are only possible with modifications which may not be suitable for general use. With simpler and more practicable modifications it is possible to reduce the temperature-rise to values within a few degrees of the maximum permissible.

The investigation is being extended to shop-window, office, and factory lighting fittings, which are to be reported on later. Patents have been taken out and the Schlieren method of photographing the heat distribution (examples of which are reproduced herewith) is to be described elsewhere. The work has been done by the British Electrical and Allied Industries Research Association (Technical Report F/T66) in co-operation with the G.E.C. Research Laboratories, the Electric Lamp and Cable Makers' Associations, and a large number of manufacturers whose fittings were tested.

Hospital Lighting

The lighting installation at St. Bartholomew's Hospital, London, which has been considerably enlarged in recent years and to which the author is consulting electrical engineer, was described in the paper by Mr. F. C. Raphael which was read before the ILLUMINATING ENGINEERING SOCIETY in London on April 11th. Stress was laid upon one matter that lately had tended to fall into the background at the meetings of the Society. This was the question of cost, particularly running cost. Generally, when lighting interiors, they had gradually fallen into the habit of ignoring this to some extent—and rightly. The lighting bill in a factory, for instance, represented a very small proportion of the total overhead charges. In a hospital, however, there was no direct connection between lighting costs and revenue. A higher degree of illumination than was warranted by actual requirements would be sheer waste. The expenditure on electric lighting alone at St. Bartholomew's Hospital, where the author could guarantee that there was no wastage, was over £1,500 during the year 1932. The particular requirements of hospital illumination were considered and the special types of lamps, fittings, switching, methods of installation, and arrangement were described at some length in the paper.

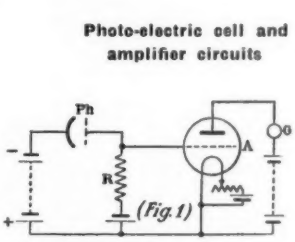
Tests on Photo-electric Cells

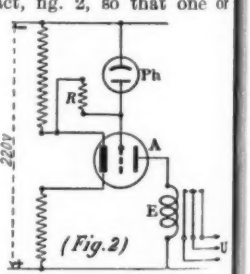
THE Public Lighting Department of the Compagnie Parisienne de Distribution d'Electricité has recently conducted successful tests with a photo-electric control unit built for general industrial service. This unit, says D. Hauser in *Revue Générale de l'Electricité*, comprises a photo-electric cell, an amplifying valve, a high sensitivity relay, and the requisite connections and terminals, the whole enclosed in an aluminium casing with asbestos packing for the door joint and watertight glands for the external leads. The photo-electric cell, which is mounted in line with a glazed opening in the door, is of the cæsium-argon type, particularly sensitive to the red end of the spectrum.

The principle of combining photo-electric cell and amplifier is illustrated by fig. 1, where *Ph* represents the photo-electric cell, and A the amplifying valve. The current *i* of the photo-electric cell produces a variation *Ri* in the grid potential, and therefore a variation *SRi* in the plate current flowing through the measuring instrument or relay G, S being the slope of the valve characteristic. Theoretically, the total amplification SR can be increased indefinitely by increasing R, but in practice the maximum value of R is limited by the conductance of the valve, and is higher when the photo-electric current charges the grid negatively. In the arrangement shown in fig. 2, the electromagnet E controls contacts in the utilisation circuit U.

As built commercially, the photo-electric relay unit operates on 200-250 V, d.c. or a.c. When no light falls on the cell, the plate current of the valve is that corresponding to zero grid current, say, 10 mA, and the electromagnet holds the relay armature. On the other hand, when the photo-electric cell is illuminated, the photo-electric current is of the order of 10^{-6} A, the plate current is reduced to zero, and the relay armature is liberated. The relay armature may be mechanically integral with the centre contact, fig. 2, so that one or other side of the circuit U is closed, according to the illumination of the photo-electric cell. The power consumption of the apparatus is about 22 W, and the relay is capable of interrupting 0.25 A at 110 V in a non-inductive circuit.

Photo-electric cell and amplifier circuits





The illumination at which the relay operates may be regulated by a diaphragm in the window of the casing, or by varying the resistance R. In a certain case, the relay responds to illuminations of 50, 30, 22 and 18 lux, with values of R=5, 10, 20 and 40 megohms respectively. In the Parisian tests the control unit was placed on the roof of a building with the cell window facing north and the resistance of 20 megohms, corresponding to a critical illumination of 22 lux.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Not Ferranti's Fire

With reference to the notice that appeared in the London daily Press that a fire had occurred in the afternoon of April 11th in a store room occupied by us at Bush House, we would inform you that the actual fire was in a store room adjacent to our premises and that we were only temporarily inconvenienced by water and only a slight delay was caused to the ordinary routine business.

We shall be pleased if you will give publicity to this announcement in view of the fact that an erroneous statement such as this may do harm to our business.

FERRANTI, LTD.,
London, W.C.2, *April 13th.* A. Middleton.

Automatic Volume Control

In reply to Mr. K. R. Sturley's letter in the ELECTRICAL REVIEW of April 14th, I may say that I purposely made the article fundamental in language, drawing and theme, but at the same time it can hardly be said that it was incomprehensive. Both carrier and audio control is used with equal success, although the diagram certainly shows carrier control. The rest, however, is mentioned in the text.

It is most inadvisable to include complications in fundamental drawings when they can be left out, and for this reason such additions as screened-grid valves and indirect cathodes were omitted, since it was hoped that readers would be able to work out the multitude of possible cases as required from the statements of principles made. I plead guilty to omitting the method of eliminating between-band noises, although at the time the article was sent for publication no such receiver was available in this country which incorporated this device, and even now there is no sign of British sets so fitted. Mr. Sturley may, however, appreciate that it is not what to put into an article of this kind which causes trouble, but rather what may be left out.

I am not advocating any particular method of approach but endeavouring from my knowledge and experience to delineate them all, and I can assure him that all the methods have their uses, when applied intelligently.

R. WHEATLEY MINTER.

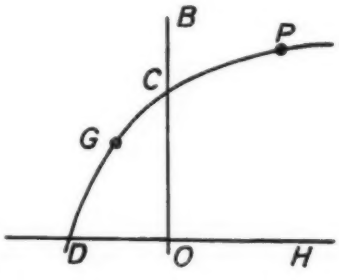
Bromley, Kent, *April 15th.*

A striking study in floodlighting in the Blue Mountains, New South Wales. The installation is controlled by Venner time switches

The Design of Permanent Magnets

In an interesting article in your issue of March 24th, Dr. Edward Hughes discusses the method of presenting the design of permanent magnets to students. In my opinion, the difficulties to which he refers are mainly due to the unnecessary discrimination between magnetic circuits containing permanent magnets and other magnetic circuits.

In the design of the magnetic circuit of a motor one uses graphs giving the relation between the magnetising force H and the magnetic induction B for the various materials employed. If one wishes to do so, one may regard the excess of B over and above what it would be in a non-magnetic material as being due to "an inherent magneto-motive force" called into being by the applied magnetising force, but for purposes of design it is quite unnecessary to worry about such molecular causes for the relation between B and H.



If P C G D represents the B-H curve of the material, the designer, when working at the point P, does not introduce any conception of an inherent magneto-motive force, and surely it is better to follow consistently exactly the same procedure when working at the point G, or at any other point on the curve. For a given magnetic flux one calculates the values of B in the various parts of the circuit, and then from the curves finds the corresponding values of H, and sums up the products $10/4\pi$ *Hl* around the whole circuit including the air-gaps, to obtain the total ampere-turns. If the value of B in any part of the circuit corresponds to a point like G lying to the left of the origin, the corresponding H is negative, but that only means that in summing up the products $10/4\pi$ *Hl*, it will contribute a negative term to the total, and will thus reduce the total ampere-turns required. If there are no ampere-turns—as in the simple case considered by Dr. Hughes—then the positive and negative terms must exactly cancel.

It may be objected that from this point of view the steel working at the point G will have a negative permeability, but far from being an objection, this emphasises the consistency of the procedure and point of view, for on passing to the left of the origin, with B in the same direction as before, H has to be reversed so that the permeability must change its sign.

When a student is faced with the design of a permanent magnet it is, in my opinion, a mistake to tell him to throw overboard what he has already learned concerning the design of magnetic circuits and approach the problem from a new point of view. One should certainly indicate to him that permeability whether positive or negative is probably due to inherent magneto-motive forces of molecular origin.

Glasgow University, *April 11th.* G. W. O. HOWE.

The Electrical Association for Women

When I remember that the subscriptions to institutions, societies, golf, tennis and other clubs are from one guinea to ten times that amount, and that the annual subscription of the E.A.W. is only 5s., I am surprised at the number of events and functions which that Association can deal with at a cost of one penny per week. I have also noted that any committees of associations that women take up cost as a rule less than they would if they were run by men.

The E.A.W. is doing a great amount of very useful propaganda work. I do not think they can be expected to train girls in electrical domestic science, when there are many establishments that specialise in this work; but the E.A.W. certificate for proficiency should be a valuable prize to be trained for. I therefore do not think that "Member," whose letter appeared in your April 7th issue, has anything to complain of.

April 12th. ANOTHER MEMBER.

Automatic Fire Alarms

With regard to the correspondence on this subject in the ELECTRICAL REVIEW, commencing with Mr. J. Scott's letter of March 31st last, we have arrived at the conclusion that a simple uncompensated type of thermostat is the most suitable for domestic and general use, and for this purpose have developed what we believe to be the simplest, smallest, and cheapest device on the market. It consists of a moulded "Bakelite" case and cover, 2⅛ in. diameter by 2 in. deep with a small brass projecting cup connected to one pole and lined with a special alloy which when the device is exposed to a temperature of 150-160 deg. F., as in the case of a fire, melts

and forms a pool in the bottom of the cup making electrical contact with a centrally placed pin connected to the other pole and so completing an electrical circuit.

If these devices are connected in parallel on any open circuit such as an ordinary house bell circuit, the bell will automatically ring if there is a fire, and will continue to ring.

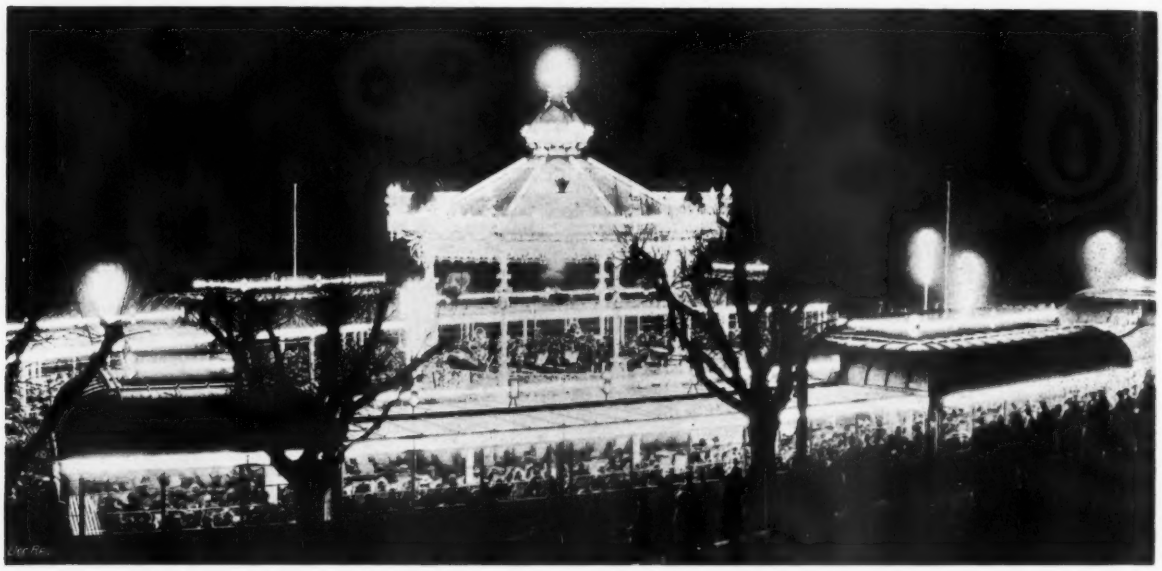
WALTER'S ELECTRICAL MFG. CO., LTD.,
London, W.10, *April 13th.* H. Parker, *Secretary.*

Canvassers and Canvassing

A good expression for canvasser is "consumers' agent." It is an easy phrase to use and quickly recognised by all. But what is the use of discussing the matter, attending the many debates and lectures, or even reading the ELECTRICAL REVIEW?

In three years I have placed many types of advertisement from the "I am willing to offer my services," descending to a humble request for employment, and the replies have been *nil.* In fact, I have become so tired of trying to get the work I want that I have run my own E.D.A. After lectures in different parts people have come up to me with inquiries. Then turning myself into a consumers' agent I have added spice to my life watching the reaction of employers when an employé in one grade does work free in another grade.

People should read Sir William Crawford addressing gas salesmen. He states that the modern science of publicity does not encourage salesmen to sell goods but to create interest leading to a request; the inferiority complex is the greatest asset to a salesman; people like modesty; never talk about



The reconstructed bandstand at Westcliff-on-Sea has been lavishly illuminated as our picture shows. The opening ceremony was recently performed by the Mayor of Southend

Employers *without exception* are not impressed by knowledge acquired outside routine. Only employment during the past year is considered of importance. Apart from agents and other journals desiring to print your advertisements, how many replies are received in answer to "Situations Wanted"?

yourself—but oh! dear, how are we to get the job even if we are fitted for it? My trouble is I have too many sinkers in my pockets that cannot be got rid of until I have landed. But I am still hoping.

ELECTRICAL ENGINEER.
April 15th.

Micanite Building Economies. By A. A. C. Dickson

IN the manufacture of thin sheet micanite used for moulding insulators and tubes, the exercise of greater care in laying the individual splittings so that they overlap carefully and form a more uniform and regular layer over the whole pattern enables a smaller size of, and consequently much cheaper, splitting to be employed with as good, and sometimes better, results than the irregularly or carelessly laid larger and more expensive splittings hitherto regarded as absolutely essential for this purpose.

The general tendency, when large splittings are used, is to hurry up the building, and consequently workers are more lax and sometimes throw the splittings together, rather than lay them individually; this is responsible for holes or gaps. These holes are receptacles into which any excess bond finds its way and under test prove to be the weak spots in the finished sheets of micanite. There is an erroneous belief among some manufacturers that by using large splittings the cost of the work can be reduced, and they also believe that, even if there are holes in any one layer due to hurried laying, the next layer of splittings will cover them and produce, when compressed, as good a material as a solid well-laid micanite sheet. Even though there may be a small saving in labour in using large splittings, the waste of mica is colossal, as a 5d. per lb. mica splitting well laid, even if it takes twice as long to lay, is cheaper to use than a 1s. 8d. per lb. mica splitting which can be laid in half the time.

Furthermore, it has been proved under test that micanite made from small well-laid splittings functions just as well as micanite made from the larger splittings, so that there is no need to indulge in this unnecessary extravagance just because it was done in the old days when people did not appreciate the necessity for economy in this field. Badly laid large splittings are a positive danger.

In the correspondence that followed my article entitled "Waste Insulating Materials" (ELEC. REV., September 2nd, 1932, p. 314), I pointed out that the time had come to get out of a groove and visualise the possibilities of economising in this direction. I mentioned that a No. 6 splitting costing 4d. per lb. gives the same results as a No. 5 splitting costing 1s. 9d. per lb., which was previously believed to be essential to the work.

These remarks apply only to thin sheet micanite used principally for mouldings (two, three, and four layers of mica splittings mainly, but it may also apply to the moderately thick sheets up to 30 mils) which have to be built by hand to get the uniformity of structure so essential to accuracy and reliability in moulding work. Some 75 per cent. of the breakdowns in moulded mica insulation are due to the poor building up of the thin micanite sheets from which the mouldings are made, and only some 25 per cent. are due to insufficient care in the actual moulding process. Where machine built micanite is concerned, usually over 30 mils thick, the performance of the material is not so exacting; therefore the same care need not be exercised in the building, and it is mainly on this account and to save in the cost of building that the machine process has been adopted.

Test records of actual practice with patterns built by girls who had only had a fortnight's training, made by Mr. R. E. Horley of the Pirelli-General Cable Works, Ltd., show that the size of the splittings has no real relation to the electric strength of the finished micanite sheet or mica tube, but uniform laying permits the use of much smaller and naturally much cheaper splittings. Tubes made with carefully laid No. 5½ splittings, costing about half the price of the No. 5, stood the test for two minutes and thereafter broke down at 50,000 V, while tubes made of the No. 5 larger and more expensive splittings broke down at only 40,000 V. This clearly shows that no advantage is to be gained by using the larger and more expensive splittings when the same results can be achieved by the use of the smaller and much cheaper grades. Consumers, in their own interests, should take special note of this and carry out more intensive research work upon the subject, as it will lead to economies not looked for in this direction heretofore.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

The "Sashalite" Photo-flash Bulb

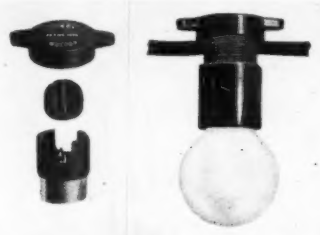
The photo-flash bulb known as the "Sashalite" is now being made by the General Electric Co., Ltd., Magnet House, Kingsway, W.C.2. It has been developed to provide better artificial lighting than that previously supplied by various forms of flash powder, and without the attendant noise, smoke or fumes of the latter; it can be used for all branches of photography, being particularly useful in cases where the employment of flash powder is unsafe or forbidden.

A "Sashalite" bulb

The bulb, which costs 2s. 6d., is of the shape of an ordinary electric lamp, and contains a small amount of thin aluminium foil in an atmosphere of low pressure oxygen. It has a small screwed cap, which fits into an electric pocket torch in place of the usual small lamp bulb. By operating the switch of the torch, current from the battery heats the filament in the bulb, around which the foil is placed. This causes the foil to burn at an intense brilliance for approximately 1/75th of a second, all smoke and residue remaining enclosed within the bulb. The speed at which the bulb operates enables exposures to be made far more rapidly than is the case where flash powder is used, and results in more natural posture and correct expression of the subject.

A New Batten and Strip-lighting Holder

The main feature of the new "Liteon" batten and strip-lighting holder is that either twin tough rubber covered or v.i.r. cables of standard gauge can be used. The overall projection with the bayonet cap is only 1¼ in., and the storm-proof cover prevents entirely the ingress of water, dust, and damp.



The "Liteon" batten and strip lighting holder

Contact is made in the usual way by means of two brass prongs which pierce the rubber sheathing of the cable and make contact with the conductors. A storm-proof cover, which screws on to the holder, can be adjusted to fit the lamp closely to meet the variations of bulb sizes, and can also be used as a shade carrier. The list price is 1s. 2d. (storm-proof cover 2d. extra), and it is obtainable from the Dominion Electrical Co., 6, Hanway Place, Oxford Street, W.1.

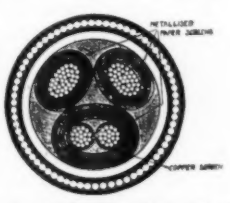
A Four-conductor Protective System

The Callender-Hunter four-conductor protective system is based upon the splitting of one conductor in a three-phase cable, the section of the conductors of the split phase being half that of the solid conductors.

The cable is connected at each end to balancing transformers which, in effect, produce an e.m.f. between the split conductors. Normally load current is shared equally between the split conductors, but on the occurrence of a fault, the balance of the e.m.f.'s is destroyed, and current circulating round the loop energises relays at either end of the feeder *via* current transformers, and the circuit breakers are opened at each end.

Improvements have now been introduced by Messrs. Callender's Cable & Construction Co., Ltd., Hamilton House, Victoria Embankment, W.C.2. These include increased sensitivity, reduced size and cost of the current transformers, and use for higher voltages.

The improved sensitivity is obtained by the redesign of the transformers which are now provided with two independent cores each, so wound that under normal load the flux in one is approximately 90 deg. out of phase with the flux in the other. The additional flux caused by a fault current produces an alteration in the phase angle of the flux in at least one of the cores, thereby disturbing the balance existing between the two ends, and causing a circulation current in the split conductors which in turn energises the relays. Operation is made primarily dependent on the change of flux angle, where previously it was dependent on the varying magnitude of a single flux.

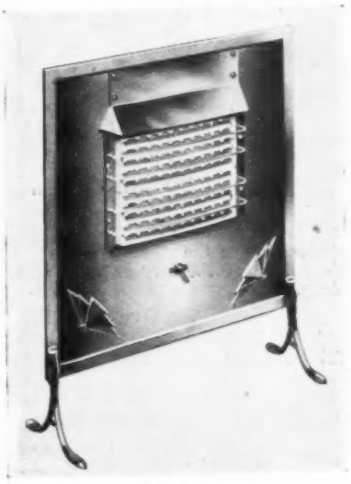


A sectional view of a 33-kV Callender - Hunter four-conductor cable

The transformer box is now sent out compound-filled, ready for use as an independent unit; the cable sealing and dividing box is separate from the transformer box, but both are so designed that they can be coupled together directly, thus preserving the iron-clad system throughout. The increased use and improvement of the gear has enabled the cost to be substantially reduced. Four-core Callender-Hunter cable with oval conductors and screening can now be supplied for working pressures up to 33 kV.

Acelite Fires

Acelite, Ltd., Halesowen, Birmingham, is marketing a new range of screen fires. No. 5, which we illustrate, can be obtained with 1 or 2 kW loadings, with a switch to cut out half the elements when required. It weighs 11 lb., and is fitted into a screen 18¾ in. by 18 in. The No. 4 model is of slightly different design, the screen being plain, and there is a handle above the fire. Finished in copper, bronze or brass both models cost 42s. Black and chromium or oxidised silver and chromium finishes cost 8s. extra. The "Regal" model is priced at 70s. (chromium, 84s.), and weighs 12 lb.



A new Acelite fire

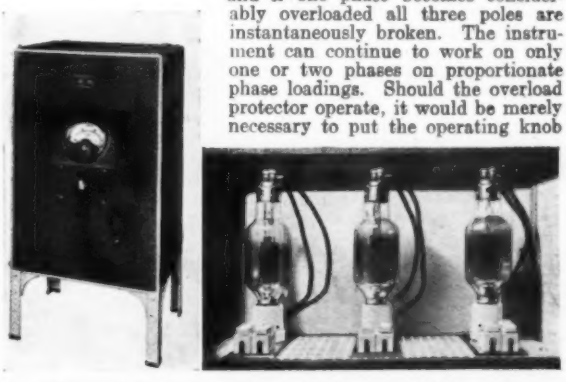
A "Combination" model is also available and includes a fire, surround and hearth. It is fitted with lugs for easy fixing to a wall, and is so designed that when permanently fixed the fire unit is readily removable. The overall size is 33 in. high by 21 in. wide by 10 in. deep. With a black and chromium inset the price is £4; with an all-chromium inset it costs £5.

Cinema Rectifying Equipment

A range of "Davenset" static hot-cathode glass-bulb rectifiers, designed specially for cinema work, has recently been marketed by Messrs. Partridge, Wilson & Co., Leicester.

The design incorporates a heavy angle-iron framework forming the basis of the instrument case, and this is covered by sheet steel panels suitably perforated for ventilation purposes. Towards the base of the case is mounted the three-phase transformer, and immediately above this is the panel on which the valves are mounted. All the components are totally enclosed, and the instrument is finally finished in black enamel with chromium-plated fittings.

An automatic overload protector-type mains switch has an electro-magnetic release wired in each of the incoming phases, and if one phase becomes considerably overloaded all three poles are instantaneously broken. The instrument can continue to work on only one or two phases on proportionate phase loadings. Should the overload protector operate, it would be merely necessary to put the operating knob back into the "on" position. The switch will not permit resetting if overload is sustained. When starting it is only necessary to put into the "on" position one single knob. Rectification commences as soon as the arc is struck, and continues to do so until the load is removed, when it automatically ceases.



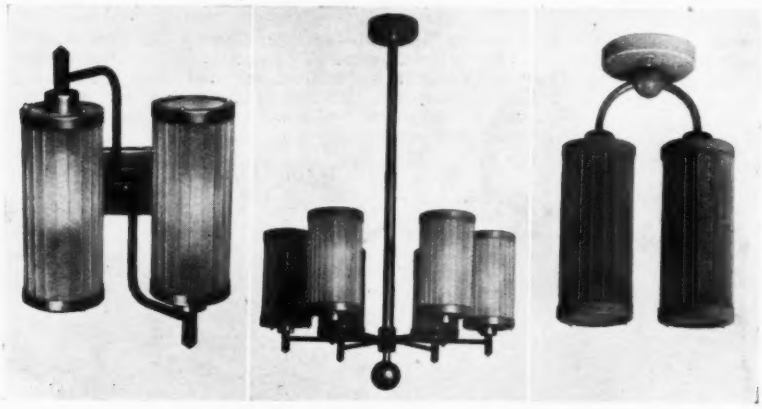
A "Davenset" type "AR25" cinema arc rectifier, showing (right) the housing of the valves and fuses

The valves are guaranteed for 2,500 hours' working life. Each valve is governed by a pair of fuses, so that valve replacement can be carried out without interrupting the operation of the equipment. Because of the very good regulation from ¼ to full-load (about 7 per cent.), no resistance adjustment is necessary.

There are four models for 25, 40, 60 and 120 A, all at

D

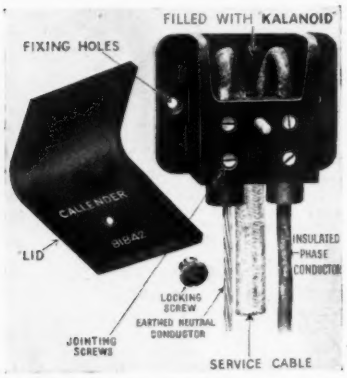
85/90-V, maximum d.c. outputs, and 2,620-W, 4,230-W, 6,400-W, and 13,090-W full-load mains consumption. The respective prices are £46, £53, £75 and £132. The overall dimensions of the smallest set are 39¾ in. by 21¾ in. by 15¾ in. deep, and of the largest set 4 ft. 4 in. by 3 ft. 3 in. by 2 ft. deep.



A selection of "Neolux Facet" lighting fittings

An Overhead Service Box

An all-insulated overhead service box known as the "Faithful" has just been introduced by Messrs. Callender's Cable & Construction Co., Ltd., Hamilton House, Victoria Embankment, London. It is designed for connecting overhead service cables, usually consisting of an insulated phase wire and uninsulated earthed neutral, to the house service cables, which, in all cases, are insulated.



The "Faithful" overhead service box

It has been found that with the ordinary methods of making these connections the ends of the cable insulation quickly deteriorate. When the "Faithful" box is used the joints are completely covered and insulated by means of "Kalanoid" plastic compound. The box is small, of neat design, and very easily erected and assembled, the jointing process being extremely simple. It will accommodate one twin or two single cables up to 0.01 sq. in.

"Flood" Projectors

Two new design fittings manufactured by Floodlighting & Fittings, Ltd., 294, Gray's Inn Road, W.C.1, are well made though inexpensive.

Model "A" floodlight, of heavy gauge copper, is designed to take an ordinary 300- or 500-W lamp, and is 13 in. in diameter. Ventilation is provided for, and the system of bracketing makes fixing in any normal position a simple matter. The reflector is embodied in the shell of the floodlight, and is of special synthetic stoved white enamel, which is designed to give a clear white reflection with no "spot" effects. The pleasing appearance is obtained by bronze as the standard outside stoved enamel finish. The price is £3 15s.

To overcome the difficulty of fixing floodlights in high or inaccessible positions, the "Flood" projector is offered, taking a 500- or 750-W lamp. Pre-setting of the filament centre, and the focus of the beam from a "spot" to 30 degrees spread is provided for, while the construction is entirely weatherproof. An optically ground lens of 7 in. diameter is fitted, and this is protected by a further plain glass. For ventilation there is a system of channelling in the interior, which is stoved white enamel, and the standard outside finish is again bronze. Heat-proof handles make this projector also convenient to use for inside or outside "movement" operation, and both the floodlight and the projector can be fitted with colour glasses, if desired. The projector price is £6 complete, exclusive of lamps.

The new "Flood" projectors

Artistic Lighting Fittings

Messrs. Louis Dernier & Hamlyn, Ltd., 23, Newman Street, W.1, have recently introduced a range of "Neolux Facet" fittings, which are constructed of strips of glass built in cylindrical form in metal ends. They are available in many colours, and in various styles of ceiling and bracket equipment. Ceiling fittings are available with up to six units (cylinders). There are two cylinder sizes, and prices are from 22s. 6d. upwards.

A Miniature Mains Switch

We recently examined a very neat miniature mains switch which Messrs. A. F. Bulgin & Co., Ltd., Abbey Road, Barking, Essex, are marketing at 1s. 9d. each. Although rated at 3 A at 250 V, the switch body measures only about ¾ in. square, and the q.m. and b. movement is operated by a very small rotary movement of the handle.

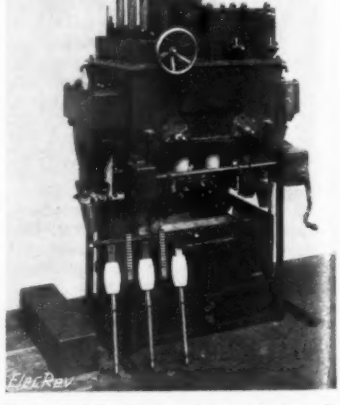
The insulation resistance of the switch in an atmosphere of normal humidity is well over 60 megohms, and the contact resistance is of the order of 0.01 ohm, or less, even under conditions of 50 per cent. overload. The switch is suitable, not only for controlling the mains circuit of wireless apparatus, but also for electrical apparatus of fairly low rating, such as toasters, curling iron heaters, hair dryers, fans, and like apparatus.

The new Bulgin miniature switch

Ring Main Control Units

A range of ring main control units made by Messrs. Crompton Parkinson, Ltd., Bush House, W.C.2, forms convenient and inexpensive control gear for use in conjunction with switchgear controlling the tee-off. This switchgear was designed primarily for use in conjunction with the Crompton "Klad" circuit breaker, but is adaptable for coupling to other forms of switchgear.

In the simpler form made, the unit consists of a welded steel tank structure supported on suitable framework. Two quick break oil immersed switches of the gang-operated type are provided for disconnecting the ring main; these switches have renewable sparking contacts and are capable of breaking full load current. Contacts are provided for earthing either cable, and are operated by auxiliary handles interlocked with the main switch handle so that they cannot be operated when the main switch is closed. Testing terminals are provided just below oil level. All other live metal is covered by an insulating barrier so when the inspection covers are opened damage cannot be caused by the accidental dropping of a tool or bolt into the switch tank.



Type "B" ring main control unit with one isolating switch removed and testing contacts fitted in its place

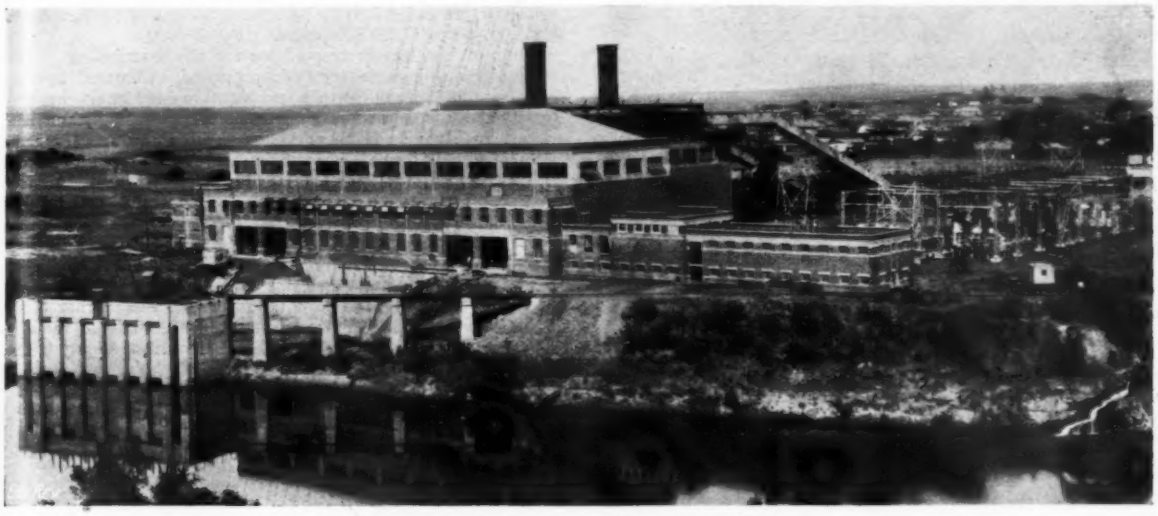
A development of this unit is now made in three types—"B," "C," and D." The new models have isolating switches between the cable connections and the main switches, the isolating switches being of the "sword" type and operated by a rack and wheel; they are removable and special earthing and testing plugs can be inserted when required. Complete interlocks are provided and a tank lowering device is fitted. These ring main units are suitable for outdoor use and for circuits up to 11,000 V.

Electricity Supply in South Africa

A review of ten years' progress

A PUBLICATION entitled "Ten Years" has been issued by the Electricity Supply Commission of the Union of South Africa. This is a well-produced document with numerous illustrations recording the progress made during the past decade. It thus brings up to date in some of its figures the information given in the review of the Commission's annual report for 1931, which appeared in our issue of August 26th last.

The Commission was formed as a result of the Act of 1922, which followed the recommendations of Sir Robert Kotzé's Committee arising out of a report made by Mr. C. H. Merz, and is claimed to be the first non-profit making body of its kind in the world to be free from Parliamentary control. Its primary obligation is to develop actively the supply of electricity to ensure the provision of cheap power. It also has the duty of reporting with recommendations to the administrations of the various provinces on the proposals of local authorities to establish or extend undertakings; it has now issued 253 of these reports.



The Natal Central power station, South Africa

The Commission owns four steam and one hydro station with an aggregate capacity of about 260,000 kW of generating plant (including boilers capable of evaporating three million lb. of water per hour), and 750 miles of transmission lines and cables serving an area of 11,000 sq. miles; the transformer capacity is nearly 400,000 kVA. Most of the electricity is sold as a.c., but d.c. is provided for the railways by means of eighteen sub-stations operated by the Commission. The capital invested in the Commission's undertakings is £8,000,000. All loans, except the recent public issue of £500,000 of 4¼ per cent. redeemable local registered stock at £100, have been taken up by the Government at 5.018 per cent. per annum. Interest obligations totalling £478,000 had to be met before the Commission's undertakings were productive, since when over £2,500,000 has been paid to the Government and £816,000 has been put to reserve. Assets now exceed liabilities by £1,200,000, and the revenue is over £1,000,000 per annum.

The larger consumers include twenty-four towns, the Victoria Falls Co., and the Railways Administration, together with collieries, gold mines, and a number of other industries. There was a fall in sales in 1931, but 1932 showed an improvement over any preceding year, a falling-off in the railway consumption being compensated for by increase in the industrial load.

The Commission's Generating Stations

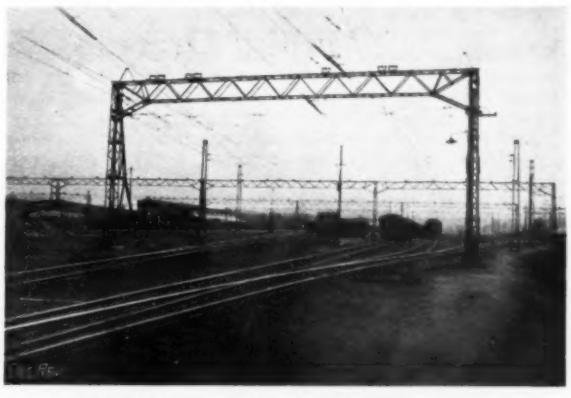
The 50,000-kW Cape Town (Salt River) undertaking was established primarily to supply electricity for the Cape Town suburban railway and was interconnected with the municipal undertaking. Last year an agreement was made with the City of Cape Town to operate the two stations as a single unit. The output from Salt River in 1932 was 65 million kWh. From the 100,000-kW Witbank station, which is run in co-operation with the Victoria Falls Co., electricity is supplied to large users at 8s. 4d. per month per kVA and 0.046d. per kWh. Domestic consumers are charged 0.5d. per kWh. The output from Witbank in 1932 was 611 million kWh.

A new 48,000-kW station using pulverised fuel with automatic boiler control was erected at Congella to supply the railways and the major portion of Durban municipality's load. The tariff is £3 15s. per kW and 0.175d. per kWh. The output in 1932 was 110 million kWh. The anticipated electrification of the main railway from Maritzburg to Durban has not materialised, but the Maritzburg to Cato Ridge section was completed in 1931. The electricity for this is taken from the 60,000-kW Natal Central station at Colenso, which was acquired from the Railways Administration in 1927. The output in 1932 was 107 million kWh. Prior to the electrification the maximum load permissible on the railway was 1,000 tons for one section and less for others, necessitating frequent re-marshalling; now, a 1,500-ton train is conveyed over the entire route without being altered with an average speed up the ruling gradient (1 in 65) of 21 m.p.h., compared with 8 m.p.h. with steam. Power for the Sabie gold mines in the Transvaal is supplied from a 1,350-kW hydro-electric station with an output of 6 million kWh per annum.

There are 571 on the Commission's staff, of whom 167 are natives. The Commission pays tuition fees up to matriculation standard, in advance, for junior employés, the amount being deducted from their pay in small monthly instalments. Vocational training of university students (who receive the ruling rate of apprenticeship pay) is undertaken by the Commission.

In areas where the Commission carries out local distribution, domestic appliances can be obtained on hire purchase.

For a few months every year before the rainy season salt deposits caused trouble on the 33-kV lines at Cape Town. Washing the insulators has been found the most certain means of avoiding shut-downs from this cause. Petersen coils are used to reduce the magnitude of the earth currents and where lightning storms are severe. All sub-stations are equipped with arrestors, and at some of the latest sub-stations the line insulation has been weakened on adjacent overhead spans. Witbank power station maintains communication with the Victoria Falls Co.'s control room at Germiston by impressing radio waves on to the 132-kV power line, whence at the receiving end they are transferred again to an aerial.



Overhead work on the electric railway, Natal

Electrical Contractors' Supplies for Chile

Price again the ruling factor

THE physical features of Chile have favoured the electrical development of the country, and recent years have witnessed a steady extension in the consumption of electricity both for lighting and power. Sources of abundant water power close to centres of population have made it possible to sell electricity at very attractive prices, and there was an increase in energy consumed from 229.3 million kWh in 1927 to 301.1 million kWh in 1930, although in 1931 the demand was reduced to 282.8 million kWh. In a recent Department of Overseas Trade report on the market for electrical contractors' supplies in Chile it is stated that the electricity supply industry is mainly foreign controlled, and consequently the standards and practices adopted in the production and distribution of electricity have been closely related to those customary in the country of the operators. Approximately 77 per cent. of the electrical energy consumed is produced by the Cia. Chilena de Electricidad, originally a German concern but taken over by American interests in 1929.

The Cía. Chilena supplies the provinces of Aconcagua and Santiago, containing the two main centres of population, Valparaíso and Santiago, which alone probably absorb more than 50 per cent. of the electrical equipment sold in Chile. The next largest concern in Chile is the Cía. Industrial de Electricidad serving the district lying immediately south of the capital. This company generally adopts the practices of the Cía. Chilena, thus confirming the influence of that concern on the nature of the electrical equipment market. There are a number of smaller power and lighting plants serving other parts of the country, but their requirements or sphere of influence are not large enough to affect the general trend or the character of the demand for electrical materials and apparatus.

Methods of Distribution

Distribution generally is effected either at 220 V d.c. or 220/380 V a.c., and change-overs from d.c. to a.c. are being undertaken where circumstances permit. The Chilean Government maintains a department, called the Sección Reclamos Pruebas y Control de Instalaciones Eléctricas, which is responsible for the drawing up of wiring specifications, the inspection of electrical installations, and the approval of material used in them. No materials which have not been approved by this department are allowed in electrical installations, and the department has the power to condemn electrical contractors' supplies which do not conform to its standards. Although these keep in view British and American standards, they are mainly based upon German specifications and practices which, combining cheapness with a good appearance, are found to be more suited to local conditions. While the department is charged with the inspection of electrical installations, in practice this work is left to the power companies.

There is little local manufacture of electrical equipment and materials and practically the whole of the demand is satisfied from foreign sources. Wrought iron lamp fittings of Chilean manufacture have, however, become popular, but have been unable to stem the progress made by foreign fittings. The local production of insulators, which has been developing in recent years, will be given an impetus by the present difficulties in the import trade as national materials are utilised in their manufacture. The present financial situation has also led to the local production of fuse and insulated wires, both of poor quality, but which the authorities have been forced to accept on account of the great difficulty of importing foreign supplies. Endeavours are also being made to manufacture switches of the lever type.

The Import Trade

In 1931 the total value of imports of electrical apparatus and materials was 37,063,786 pesos, which was 14,113,542 pesos lower than in the preceding year. The principal supplying country was the United States with goods to the value of 21,727,000 pesos (24,117,000 pesos in 1930), Germany's share being 8,430,000 pesos (14,756,000 pesos) and the United Kingdom's 3,465,000 pesos (7,039,000 pesos). (Peso=6d.)

Some of the factors responsible for the distribution of the import trade have already been indicated. Summed up they are the adoption of German standards as the main basis of the official wiring regulations; the entry and establishment of American products in the market during the war period and the consequent acceptance of American standards; American control of the chief power and light company and American activities in building construction; and the relative high price of United Kingdom electrical products.

Subject to a satisfactory appearance of a product the ruling factor of the Chilean market is price, and it is stated that 90 per cent. of the domestic electrical installations are carried out with the cheapest possible equipment. In the smaller offices installations are also of the cheapest type, while in factories they are usually as primitive as the Government regulations allow.

Prospects of Increasing Business

In these circumstances, unless the prices of British goods are reduced it will be impossible for them to obtain more than a very limited share of the market. Also Chilean tastes change rapidly and are not greatly concerned with durability. Particular cases in point are conduit, insulated wires and switches.

A change of policy regarding the quality of British goods cannot perhaps be embarked on solely to satisfy the Chilean market. On the other hand, United Kingdom styles with a few modifications would be generally accepted. To make a strong bid for the market a centralised selling organisation would be indispensable, but there will, however, always be a small amount of trade securable through the medium of local agents or through dealing direct with importers.

At the moment there is considered to be little possibility of increasing United Kingdom electrical trade. The Chilean export market has declined to such an extent that incoming foreign exchange is not sufficient to cover even imports of prime necessities. Consequently imports of electrical materials have been reduced almost to the point of suspension, being confined to absolutely indispensable repairs.

British Overseas Electrical Trade in March

	Exports.			Imports.			Re-Exports.		
	Electrical exports for Mar., 1933.	Inc. or dec. as compared with Feb., 1933.	Inc. or dec. as compared with Mar., 1932.	Electrical imports for Mar., 1933.	Inc. or dec. as compared with Feb., 1933.	Inc. or dec. as compared with Mar., 1932.	Electrical re-exports for Mar., 1933.	Inc. or dec. as compared with Feb., 1933.	Inc. or dec. as compared with Mar., 1932.
Insulated wires and cables ...	£98,489	+ £25,625	+ £2,556	£12,941	− £1,140	− £3,803	£127	+ £100	− £58
Electric carbons	1,563	+ 33	+ 419	11,204	− 593	+ 8,170	13	+ 13	− 46
Arc lamps and searchlights ...	322	+ 152	+ 105	32	− 379	+ 32	—	—	− 134
Incandescent lamps	37,493	+ 3,919	+ 7,398	12,512	+ 2,364	+ 2,813	906	− 84	+ 407
Other lighting apparatus ...	23,839	+ 2,408	+ 949	21,853	+ 6,497	+ 6,101	2,581	− 3,078	− 261
Batteries and accumulators ...	56,008	− 1,556	+ 7,244	1,388	− 445	− 5,366	58	− 12	− 16,322
Meters and instruments ...	23,710	+ 3,014	− 15,915	25,327	− 1,280	− 2,182	703	+ 395	− 29
Unenumerated electrical goods and apparatus	74,838	+ 3,966	− 17,136	35,452	+ 1,511	− 6,075	3,712	+ 817	+ 1,412
Telegraph and Telephone Cable and Material—									
Telegraph and telephone wires and cables (not submarine)	18,843	− 1,045	+ 180	501	+ 432	− 171	40	+ 35	− 221
Submarine telegraph and telephone cables	3,161	+ 107	+ 538	—	—	—	—	—	—
Telegraph and telephone apparatus	230,267	+ 69,375	+ 92,147	51,277	+ 13,575	+ 13,013	1,538	− 4,587	− 2,527
Electrical Machinery—									
Railway and tramway motors	2,021	+ 177	− 8,240	—	—	—	—	—	—
Other motors and generators	159,210	+ 46,427	+ 30,225	—	—	—	—	—	—
Unenumerated electrical machinery	154,392	+ 54,601	− 52,633	21,535	+ 7,469	− 2,671	4,770	+ 1,496	− 7,279
Total	£884,156	+ £207,203	+ 47,837	£194,022	+ £28,011	+ £9,861	£14,448	− £4,881	− £25,058
Decrease for the first three months of the year	Exports. £61,738			Imports. £268,620			Re-exports. £23,130		

Capability and Experience. By R. Wheatley Minter

A short-sighted employment policy

THE "Situations Vacant" sections of various newspapers and trade publications frequently contain announcements which demand that applicants shall "have had precisely similar recent experience elsewhere—no others need apply." Seldom are applicants required to show by their qualifications that they will be capable of performing the tasks assigned to them.

It may be interesting to consider where this will eventually lead industry. In effect, such a policy declares that what a man has not done, he can never do; or, that identical previous experience is absolutely necessary to minimise time lag in settling down to new work. Further, it effectively keeps the existing unemployed without hope of employment in the future: for if a man has been out of employment, say, six months, he cannot be said to have had recent experience in anything in particular, and the longer he remains unemployed the more unlikely he will be to find employment. Of course, there are exceptions, but it is the only logical conclusion at which we can arrive in following through the ultimate effects of this attitude.

Conversely, the man most likely to secure any employment under this system is one who is doing the same work with another firm. He thus moves from one position to another and a kind of "general post" of employed persons can then be visualised, whilst unemployed persons waste their stamps in applying for the appointments.

The practice of demanding identical experience elsewhere arises from the idea that there is no need to teach the newcomer his work; he is assumed to be capable of walking from one door on Saturday noon into another on the following Monday morning without turning a hair and without missing a step in his progress. Yet there are not two factories or offices in the whole of the country which are more than remotely alike, or in which even the same systems are worked in the same way. Even engineers engaged on research will find themselves confronted with instruments and methods with which they are none too familiar and with fresh products which they may have never seen before, though they perform similar functions. So that, in any event, there must be that time lag during which little, if any, productive work is done.

The Discovery of Promise

In days gone by, before the control of businesses passed from the hands of their founders, principals took much pleasure in what they were wont to call "discovering promising youngsters." They went to some trouble to unearth young men whom they forthwith proceeded to train in the details of their businesses, with the object of ultimately handing over control when they themselves would take more well-earned leisure. They were not content until they had found those whom they could trust to carry on the work more or less as they desired; who, too, eventually, could take over control entirely. These principals had a comprehensive knowledge of their businesses which is wholly denied the modern specialist, but they are now fast disappearing before a deluge of office machinery and sectionalisation, through which only those with previous similar experience elsewhere are supposed to be able to find their way.

Taken to its logical conclusion, however, this present demand for identical manipulative skill has two very serious aspects. The first of these is that it at once and for all sets at naught the whole educational system of the country and its examination syllabuses in particular, since these are designed more to prove the capabilities than the experience of those who succeed in passing them. Whilst, however, it is most important to regard experience in assessing an applicant's suitability for an appointment, it is quite evident that if technical and professional qualifications are to mean anything at all, no man need be called upon to prove that he has held a similar appointment before he can be considered a suitable new employé, unless (and here lies the difficulty) the judge is not capable of assuring himself that the man he has to appoint will be able to carry out his duties satisfactorily if he has not actually done that work before.

The second difficulty into which industry may be heading in this matter is that it is thus promoting the closest possible form of inbreeding. In an industry which only appoints from those already engaged in similar work elsewhere, little that is new will emerge. What is new to one firm may already be old to another. One firm may close down and the staff shift over, perhaps *en bloc*, to the new one, to carry on, not so much where they left off, but *as* they left off—which is a very different thing.

This picture shows a number of "Maxheat" oval, low-temperature heating tubes (Wardle Engineering Co.) fixed on the roof girders in the control room at Barton power station, Manchester

Brains or Service?

The pertinent question so often asked at present, as to what are the use of qualifications when brains are not wanted here or there, is very difficult to answer as neither is held of much importance when selecting applicants for appointments. Experience is exceedingly useful, but there is no need for it to be so closely allied to the work of the moment if capability goes hand in hand with it. A capable man will often make shorter work of any particular function than another whose whole stock-in-trade is experience in similar details, for which there seems to be such a demand at the present time. To select a capable person it is essential that the selector himself should be capable and not merely experienced.

Thus we see that in selecting staffs from those who are capable but not necessarily experienced in precisely similar contemporary work or those who have, perhaps, not so much capability as dexterity, industry tends to degenerate and lose ground in good workmanship, whilst some of the best craftsmen of the day find themselves unable to secure employment. Another effect will be a dearth of those who will be able to take over control of industry as time goes on.

Britain Better than Canada for Engineers

THE correspondence that took place in our pages a month or two ago under the heading "Inadequate Mains—Indifferent Employés" has brought a letter from a reader in Toronto, who prefers to remain anonymous but adopts the pseudonym of "Vexatious," in which he relates certain experiences of his own both in this country and in Canada. Having served an apprenticeship and received an education in England, besides holding several fair positions here, he thinks he can understand the attitude of many of the writers who expressed themselves in agreement with "An Indifferent Employé," but he bids them to derive solace from the fact that the prospects of a budding young engineer in England are a thousand times better than in Canada. He adds:—

"For instance, I would refer them to your page of 'Situations Vacant,' which is practically full in every issue, and then ask them to show me a similar page in any electrical engineering magazine in all Canada and the United States. Even when things were booming over here one could not apply for an advertised job similar to those in England, but must have 'pull' to get a job of any consequence. In other words, having a personality and above anything, being a mighty good fellow socially, with the ability to be heard above everyone else, means considerably more on this side than any ability, experience, or education.

"When a job is advertised here it is pretty well understood that an official routine is being followed and that the 'successful candidate' has already been 'selected' before any application could possibly be made. With conditions such as exist here, I think young engineers in England should thank their lucky stars that they can expect some consideration when trying to better themselves without having to adopt such methods as prevail here.

"England has shown us pretty well that in constructing the grid she is by no means behind the times as so many here think, and there must be a tremendous amount of work ahead both in distribution and contracting all over the British Isles, a condition of things which would be heartily welcomed here."

Imported Electrical Accessories

Application for a Marking Order

AN application for a Marking Order under the Merchandise Marks Act, 1926, in respect of imported electrical accessories was the subject of an inquiry last week by the Standing Committee (General Merchandise) of the Board of Trade under the Act, over which Sir Hubert Llewellyn Smith presides. The application was made by the British Electrical and Allied Manufacturers' Association, and was supported by a large number of non-member manufacturers as well as by the Association of Consulting Engineers, the Association of Supervising Electrical Engineers, the British Lampholder Manufacturers' Association, the Electrical Association for Women, the Electrical Contractors' Association, Inc., the Electrical Contractors' Association of Scotland, the Porcelain Electric Fittings Association, the Incorporated Municipal Electrical Association, the Brassfounders' Employers' Association, the National Brass Workers' and Metal Mechanics' Society, the British Pottery Manufacturers' Federation, the National Register of Electrical Installation Contractors, and the London and Home Counties Joint Electricity Authority. There was opposition by the Electrical Importers' and Traders' Association. The articles in question included lampholders, switches, ceiling roses, cut-outs and fuses, wall sockets and plugs and plug adaptors up to and including 30-A rating, plugs and/or sockets for use as connectors to portable and mobile appliances, adaptors for lampholders and switchplates.

Mr. G. O. Slade (who appeared with Mr. W. E. Behrens for the applicants) said that under the provisions of the Abnormal Importations Act a duty of 50 per cent. was applied to imported electrical fittings, but the duty was reduced to 20 per cent. under the Import Duties Act. These duties had not proved effective, however, in reducing the value of importations in sterling. (Mr. F. W. Challis (secretary, Electrical Importers' and Traders' Association) interposed to disagree with the last statement.)

Mr. Slade said that it was impossible to distinguish imported and British accessories, and that Continental manufacturers deliberately copied the British articles in every conceivable way for the express purpose of misleading the purchasers. For example, lampholders for all wattages less than 100, as used in this country, were of the bayonet socket type, whereas on the Continent the Edison screw type was used; the imported lampholders were of the bayonet socket type. Again, accessories made abroad were catalogued as being made to British Standard Specifications, whereas they did not conform to the Specifications, except in so far as they would suit fittings made for use here. They had not included separately imported parts in their application, however, because they had thought that they would have been met with difficulties concerning the extra duties entailed upon Customs officials. An Order to provide that the accessories in question should bear marks of origin at the time of importation as well as at the time of sale was asked for.

Difficult to Distinguish

Mr. C. Rodgers (secretary of the B.E.A.M.A.) gave evidence, and said that the Association and non-Association manufacturers who were the applicants were the preponderating majority of the accessory manufacturers in the country. He predicted that the extension of the grid supply system would result in the purchase of increasing numbers of electrical accessories in the near future. Mr. D. Ferguson (Economic and Statistical Department of the B.E.A.M.A.) gave figures relating to home production and consumption, and the importation of electrical accessories. He stated that in some cases the German prices were less than 50 per cent. of the British prices.

Mr. Challis contended that importation had been hit tremendously by the economic situation and the duties; immediately before the duties under the Abnormal Importations Act were imposed there had been a tremendous importation, which had affected the 1931 import figures.

Mr. F. G. Quance (manager, Electrical Accessories Department, General Electric Co., Ltd.) then gave evidence. He said there was a very large sale of accessories over the counter in addition to the sales by contractors in complete installations. Only an expert could distinguish between the British and the foreign articles. Witness dealt in detail with the methods of marking proposed by the applicants for the different articles, and said that the proposed markings would not injure the goods, and would not increase their cost appreciably. It was asked also that the containers should be marked. Mr. Challis pointed out that the applicants were not asking for the marking of parts imported separately, so that if the bases of fuse boards were imported in one consignment and the fuse carriers in another, they would not need to be marked, and there would be nothing to prevent the sale of the parts separately.

Mr. H. J. Cash (managing director, Messrs. H. J. Cash & Co., Ltd.), representing the Electrical Contractors' Association, said that he bought accessories mostly from British manufacturers, but when buying from wholesalers and factors one did not know in some cases whether the articles were British or foreign. Mr. J. B. Tucker (Messrs. J. H. Tucker & Co., Ltd.) referred to a case in which English porcelain, bearing a mark of origin, was sent abroad, fitted with the necessary metal work, and imported into this country as complete switches, &c., and under-selling the British switches easily.

The chairman also asked whether it was desired that wireless accessories should be excluded, because the wireless manufacturers might in the future ask for a Marking Order, so that there would be overlapping with the present application. Mr. Slade replied that he wished to include the accessories in the present application, in so far as they were used for wireless. The present applicants made wireless accessories, but that part of their business was controlled by the Radio Manufacturers' Association. He did not think that there would be an application in respect of accessories by that association, because accessories constituted a small part of their goods, whereas they were a fundamental part of the products of the accessory manufacturers in the B.E.A.M.A.

Miss C. Haslett (director, E.A.W.), Mr. R. H. Baker (director, Kerson's Manufacturing Co., Ltd.), and Mr. F. C. Raphael, M.I.E.E., also gave evidence in support of the application, and this concluded the evidence.

The Opponents' Case

Mr. Challis, addressing the committee on behalf of the opponents, said it was the experience of the importing trade that the importation of the accessories covered by the application had been knocked to pieces by the economic situation, combined with the tariff, during the past few months. However, the importation was, according to the figures, substantial. Of course, when manufacturers in this country or any other were catering for foreign markets, they must study very closely the types of articles used in those markets, and it should not be suggested that a foreign maker was doing wrong if he laid himself out to produce what was required in the foreign market. Anyone buying from a wholesaler could know the origin of goods he bought if he wished to. The applicants had tried to get round the difficulty with regard to the marking of parts imported separately by proposing the marking of different parts of complete articles, but he was not sure that the Act really authorised multiple marking.

The chairman said it might be accepted, generally speaking, that the committee would require very strong evidence before recommending the marking of more than one part.

Mr. Challis said that in the case of some lampholders it was asked that there should be marks on four different parts. In those circumstances the buyer would not have a really fair choice because a British article would bear no mark whereas a foreign article would bear three or four. Further, he was not at all satisfied that some of the marks asked for were practicable. If imported goods had to bear marks at time of importation, then those which were re-exported to overseas customers would have to bear the marks. There had been no evidence to show that it was necessary for the goods to bear marks at the time of importation. He also asked that if an Order were made it should not come into operation for a considerable time, because abnormal stocks were in hand owing to depression in certain sections of the trade.

Mr. Slade said he had been informed that, on the average, stock was turned over in three months, which was the minimum period at which an Order could come into operation. Mr. F. C. Barnet (managing director, Wholesale Fittings Co., Ltd.), said that he had in hand a stock of ceiling roses which would last for about eight months from now, bearing in mind that the season did not commence until about September.

Mr. Challis said that unless there was some method of marking alternative to pressing or stamping, a good deal of existing stocks could not be disposed of after the Order came into operation, assuming it were made. Mr. Slade, dealing with multiple marking, said that if it were not applied it would become easy to import some parts of an accessory, perhaps constituting 70 per cent. of the whole, and assemble them with other parts made over here, and thus evade the Marking Order. If the committee did not recommend an Order requiring goods to be marked at the time of importation, he asked that there should be a provision that the goods should bear marks when exposed for sale wholesale as well as retail.

The inquiry then closed and the committee will report to the Board of Trade in due course.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The Moscow Trial

The trial of the six employés of the Metropolitan-Vickers Electrical Co., Ltd.—Messrs. Monkhouse, Thornton, Macdonald, Cushny, Nordwall, and Gregory—who were arrested on charges of sabotage, espionage, and bribery, commenced in Moscow on Wednesday last week. A surprise was Mr. Macdonald's plea of "guilty," although the other British accused denied all the charges, Mr. Thornton declaring that, in admitting espionage in prison, he was excited and did not tell the truth; all the Russians charged pleaded guilty. A spirited defence was put

One of the most popular features of the Ideal Home Exhibition is the display arranged by the British Electrical Development Association. Our picture shows the enquiry bureau which is rendering useful service

up by Mr. Monkhouse on Saturday, when, despite many interruptions, he succeeded in stating that "the whole case was a frame-up against Metrovick based on the evidence of terrorised Russian prisoners." In his final speech Vishinsky, the Soviet Prosecutor, withdrew the charges against Gregory, but asked for the "severest possible" punishment for the remaining Englishmen; all of them, he said, deserved death, but the Soviet Government did not seek vengeance, but the defence of the revolution.

The decision was announced early on Wednesday. Mr. Gregory was found not guilty and acquitted. The others were found guilty: Mr. Thornton was sentenced to three years' imprisonment and Mr. Macdonald to two years' imprisonment, and Messrs. Monkhouse, Cushny, and Nordwall to deportation. Heavier sentences were imposed upon some of the Russian accused. It is announced that an appeal is to be made.

The King held a Privy Council at Windsor on Wednesday to sign a Royal Proclamation imposing an embargo upon the importation of Russian goods.

The Metropolitan-Vickers Co. stated that it intended to continue work upon its Russian contracts both at Trafford Park and in the country.

Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable-Making Industry announces that a fall in the cost of living to 37 per cent. above the 1914 level will involve a reduction in wages in the industry on the third pay day in May. The decreases in the weekly wages are as follows:—Male time workers: District No. 1, 1s. 11½d.; District No. 2, 2s. Youths and boys (18-21): District No. 1, 1s. 5½d.; District No. 2, 1s. 6d. Youths and boys (14-17): 5½d. or 6d. Women (18 or over): 1s. Girls (14-17): 6d.

The "Britram Nite-a-Lite"

The Universal Electric Lamp Co. informs us that the new "Britram Nite-a-Lite" mentioned in our last week's issue is rated at 5 c.p., not 5 W as stated.

Recent Contracts

The Cambridge Instrument Co., Ltd., is supplying, through John Thompson (Water Tube Boilers), Ltd., two sets of panel mounted instruments for the boiler house at the Stuart Street power station, Manchester. Each set of instruments comprises draught, CO_2 and temperature indicators and recorders. The draught gauges are fitted with vertical edge-wise scales, three scales being mounted side by side in the one flush-mounted casing, showing respectively the draught in the combustion chamber, in the boiler outlet, and in the economiser outlet. The CO_2 percentages and flue-gas temperatures are recorded on two-point motor-driven recorders of the potentiometric type, flush-mounted with continuous monthly records. Electrical distance thermometers are also being supplied, in connection with which multi-point indicators of the recently introduced Cambridge illuminated moving scale type are being fitted to the panels. These indicators, which are also flush-mounted, are provided with a twelve-point switch below the window, arranged to give connections to the thermometers measuring the steam outlet, economiser inlet and outlet, boiler outlet gas, and economiser outlet gas temperatures.

Messrs. C. A. Parsons & Co., Ltd., Newcastle-on-Tyne, have received an order for a 20,000-kW turbo-alternator for the Salt River power station, Cape Town. This is in addition to an order booked a few days ago for similar machinery for the Congella power station, South Africa.

E.D.A. Activities

During 1932 the Leeds Circle of the E.D.A. held twelve meetings and did a considerable amount of useful work. The first meeting of the current year was held on April 3rd, when Mr. J. Innes (contractor) and Mr. E. A. Marx (Siemens) debated on the relations between contractors and manufacturers. Plans are in hand for providing regular monthly lectures next winter.

Electrical Machinery Exports in March

The following figures relate to the exports of electrical machinery from Great Britain during March, notes of increases or decreases being made as compared with the corresponding month of last year:—

	Quantities.		Values.	
	March, 1933. Tons.	Inc. or Dec. as Compared with March, 1932. Tons.	March, 1933. £	Inc. or Dec. as compared with March, 1932. £
European countries	873	− 500	146,538	− 34,709
Japan	*	− 2	426	− 491
South American countries ...	74	− 49	11,986	− 7,948
South and South West Africa ...	475	+ 273	60,024	+ 30,721
British India	319	− 18	41,102	− 9,624
Australia	58	+ 27	8,729	+ 2,467
New Zealand	39	− 47	6,774	− 6,831
Canada	9	− 79	1,984	− 9,502
Other countries	298	+ 62	38,078	+ 5,269
Total	2,145	− 333	£315,623	− £30,648

* Not stated

As the table on page 568 shows, there was a considerable improvement both in electrical import and export trade generally during March, the export figures in particular showing substantial advances in most cases as compared with the previous month and with March, 1932.

The Clock Manufacturers' Association

The first annual general meeting of the British Clock Manufacturers' Association took place recently in London, when the chairman gave an account of the activities of the Council during the past year. The Association's case for increased tariffs on clocks has been submitted to the Government. It has prepared a case for increased Imperial preference, was represented at the Ottawa Conference, and negotiations are being

One of the new Ferranti synchronous electric clock display boards which are now available. They are made of wood attractively finished in black, green, and primrose

carried on with the Dominions at the present time. The Association is applying for a marking Order under the Merchandise Marks Act in respect of imported electric clocks; the application will be heard shortly.

Members of the Association now include practically all the

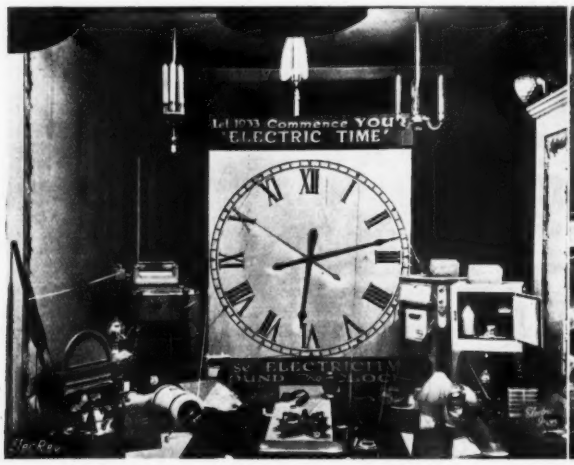
leading manufacturers of clocks in this country, mechanical, synchronous, and electrical. The Council now consists of Messrs. A. Gordon Smith (chairman), C. E. Newbegin (vice-chairman), C. T. Baxter, C. P. Beardsall, F. Hope-Jones, E. E. Sharp, and P. J. Chaplin (secretary).

An Important X-ray Agreement

Messrs. Watson & Sons (Electro-Medical), Ltd., have recently concluded an agreement under which they will take over the exclusive selling rights in Great Britain of medical X-ray apparatus hitherto sold by Messrs. Philips of Eindhoven. The agreement also gives the company the right to manufacture in its own factory medical apparatus developed by the Philips Research Laboratories and covered by Philips "Metalix" patents. X-ray tubes and valves and industrial X-ray apparatus are not included in the agreement.

Illumination Design Course

A busy time awaits those who propose to take part in the Twenty-seventh Illumination Design Course organised by the Electric Lamp Manufacturers' Association. The Course, which will be held at the Lighting Service Bureau, 2, Savoy Hill, W.C.2, opens on Monday, May 15th, and from then until the following Friday there is a full programme of talks and discussions on every aspect of the electric lighting industry. Visits are being arranged to a number of interesting installations. On the Thursday evening those participating in the course will be entertained to dinner by the organisers. Those wishing to attend the Course should write to E.L.M.A. without delay.



On March 24th the quantity of electricity distributed by Wolverhampton Electricity Department since April 1st, 1932, reached 100,000,000 kWh, and the occasion was celebrated by decorating the exterior of the showroom with strip lighting and banners. Inside the building were arranged special topical displays, some of which can be seen in the above pictures

Registered Electrical Contractors

Applications for registration from the following were accepted by the Executive Committee of the National Register of Electrical Installation Contractors at its last meeting:—

Drew, G. A., & Co., Manchester.
Cassell, Benjamin, Harpurhey, Manchester.
Western Electrical Power Co., Liverpool.
Camden Electric Services, Liverpool.
Arnold, W. A., Manchester.
Ross, W., Aintree, Liverpool.
Carter, E., Liverpool.
Hale, B. L., Croydon.
Blount, J. H., & Co., Wolverhampton.
Central Electric Co., Liverpool.
Wright, H. E., Ipswich.
Wickham, A. D., Rochdale.
Hill, J., & Son, Manchester.
Electric Light Motor & Engineering Co., Liverpool.
Williams, C. F., Farnham.
Ellis, J. E., Great Plumstead, near Norwich.
Springvale Electrical Co., London, W.14.
Lee, G. A., Attleborough.
Powell, Ernest, Longsight, Manchester.
Lauder, J. R., London, E.C.2.
McGhee, F. L., & Co., London, S.W.1.
Collins, F. V., & Co., Wimbledon.
Stott, J., & Son, Ltd., Liverpool.
Winter Bros. (Moston), Ltd., Blackley, Manchester.

At the same meeting eight applications were declined and two were withdrawn.

Trade Announcements

Morris Commercial Cars, Ltd., has now completed its programme of new vehicles by the introduction of a range of 30-cwt., 2-ton and 3-ton four-cylinder models. This is in addition to the new range of six-cylinder models announced a few weeks ago.

Industrial Electroplant, Ltd., has removed its offices to 40, Broadway, Westminster, S.W. (Telephone: Victoria 2813.)

The telephone number of the Westinghouse Brake & Saxby Signal Co., Ltd., has been changed to "Terminus 6432."

Messrs. Davies & Jones, electrical engineers, have opened new premises at 97, King Street, Ramsgate.

Messrs. Attwoods (Factors), Ltd., Fryer Street, Wolverhampton, have opened a wholesale electrical department.

Prices of Materials

Messrs. Edward Till & Co. report, April 19th: **India-rubber**, Para fine, 4¼d., ⅛d. inc.

Messrs. James & Shakespeare report, April 19th: **Copper** bars, no change. English pig lead, £12 10s., 5s. inc.

Messrs. F. Smith & Co. report, April 19th: **No change** in the prices of silicium bronze wire and electrolytic copper.

Hull and Electrical Contractors

The Hull Electricity Committee, on the recommendation of the city electrical engineer, has decided that as from October 1st next all the department's orders for installation work shall be divided as evenly as possible between approved contractors. The qualifications for inclusion in the Department's list will be (*a*) the certificate of the National Register of Electrical Installation Contractors, and (*b*) residence in the Department's area of supply for not less than two years.

Hotel Sound Reproduction Equipment

An excellent example of up-to-date sound reproduction apparatus equipment as applied to hotels is to be seen at the "Old Crown" at Slough. In this recently modernised building the main amplifier (illustrated) is installed in the reception office under the direct supervision of the operator. To preserve accessibility and economy of space, the rack mounting system has been employed and all individual panels are assembled on a channel iron frame. The top panel houses the radio receiving unit, below being the output switch panel, the mains switch and fuseboard panels. The equipment is surmounted by a loud speaker, which is used as a pilot, as well as a 6-W output alternative amplifier and a microphone. The management finds the microphone useful for "paging" guests, for urgent messages and 'phone calls. Extensions from this equipment run to the lounge, saloon bar and the public bar, in all of which loud speakers have been installed in cabinets matching the panelling of the walls. In the restaurant twin moving-coil loud speakers of the concert hall pattern have been fitted to baffles across the roof bearers, so that the sound enters through two disguised ceiling grilles. The equipment, which is of G.E.C. manufacture, was installed by Messrs. T. Bridger & Co.

The main amplifier panel at the Old Crown Hotel, Slough

Allis-Chalmers' Loss

The operations of the Allis-Chalmers Manufacturing Company in 1932 resulted in a loss of $2,955,043, as compared with

a net income of $1,256,431 in 1931. According to the *Electrical World* electrical apparatus sales were greatly reduced because of the almost complete cessation of capital expenditure for new equipment on the part of public utilities, industrial manufacturers, steel mills, railroads, and other industries.

New Municipal Showrooms

Steps are being taken by East Ham Corporation to acquire premises in Manor Park for use as electricity showrooms.

The Carlisle borough electrical engineer is to report on the provision of a central electrical showroom.

Colour Floodlighting Development

An interesting development in colour floodlighting is announced by the General Electric Co., Ltd. Instead of the usual tungsten filament lamp and colour media used for ordinary coloured floodlighting purposes, the new system employs a gaseous discharge lamp which gives a coloured light of blue, green, or red, which can be mixed and blended to produce very spectacular effects. An advantage of this new system is that the whole output of the light is projected on to the building and none is absorbed by colour media, two or three times as much coloured light being obtained as by the tungsten lamp and colour screen system for an equal consumption of electricity. The "tubes," as they are called, have luminous columns about 34 in. long., and are rated at approximately 470 W for red light and 350 W for blue and green. Appropriate reflectors have been designed for use with these tubes which require special controlling apparatus, part of which is housed in the unit itself. At the moment they are only available for 200 to 250 V a.c. 50 cycles. The life of each tube is not less than that of an ordinary high wattage lamp. Our illustration shows the Hop Bine Hotel at Wembley, the first building to be illuminated by the new system.

Social Events

The twenty-fifth annual dinner of the travellers of the General Electric Co., Ltd., was held on April 7th at the Connaught Rooms, W.C. The directors present included Sir Hugo Hirst, Bt., Messrs. M. J. Railing, J. Y. Fletcher, C. Wilson, J. H. Farthing, L. C. Gamage, M. Solomon, and F. Winstanley.

The football team of the County of London Electric Supply Co., Ltd. (head office section) visited Ostend on Good Friday to play the V.G. Football Club (reserves) at the Parc Marie Henrietta. The team was accorded an official welcome by the Mayor and aldermen of Ostend at the Town Hall. The match provided a close struggle, the Ostend club winning by two goals to one. In the evening a gala dance was held, arranged by the Ostend Town Council and the Van Neste Genootschap Football Club, at which the Van Gastel cup was awarded to the winning team. On Sunday a match was played with the Cercle Sportif Ypres, the result being a win for the Ypres club by two goals to one. After the match the County team visited the battlefields.

The second eleven football team of the Revo Electric Co., Ltd., has won the Silversmiths' cup, defeating the Oriental Tube Colts in the final of the Birmingham Works Colts League by seven goals to three. We reproduce a photograph of the winning team.

On April 10th the Metropolitan-Vickers Girls' Club gave its annual display of examples of handiwork in dressmaking, cooking, leatherwork, and barbola-work. Sir Felix and Lady Pole and Mr. and Mrs. G. E. Bailey were present, and the Lady Mayoress of Manchester, Mrs. Davidson Peattie, presented the awards, her presence lending more than usual interest to the occasion, as she at one time occupied the position of women's supervisor at Trafford Park Works. Displays of first aid, drill, and dancing were given, two plays were staged, and there were also music and songs. Miss Zehetmayr, the employment supervisor for women at the Trafford Park Works, organised the display. Lady Pole performed the difficult task of judging the exhibits.

New Catalogues and Lists

Dorman & Smith, Ltd., Salford, Manchester.—Catalogue No. 123, illustrating and describing fuses, distribution boards, switchboards, lighting fittings, connectors, and other electrical accessories. In addition to 176 pages of text there is a generous supply of squared paper.

British Central Electrical Co., Ltd., 6 and 8, Rosebery Avenue, E.C.1.—A leaflet on "Zonelite" tubular lamps for offices, hospitals, cinemas, workshops, &c.

Hotpoint Electric Appliance Co., Ltd., 24, Newman Street, W.1.—Leaflets dealing with the new "Hotpoint Junior" vacuum cleaner and the "Hotpoint-B.T.H." washer and wringer.

M. & C. Switchgear, Ltd., Kelvinside Works, Kirkintilloch, Glasgow.—Publication No. K.31/1A, describing metal-clad oil circuit-breakers.

Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.1.—A window bill issued in connection with the forthcoming opening of the new West Regional station at Washford Cross.

L. G. Hawkins & Co., Ltd., 30/35, Drury Lane, W.C.2.—The April issue of the "Link" with a supplement giving particulars of the "Supreme" radio set and valve tester. Also a leaflet on the "Tricity York" portable fire.

A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—Pamphlet No. 372 dealing with type "M.G." h.p. outdoor air-break switchgear and overhead line equipment.

Marelli & Co., Ltd., 19 & 20, Garlick Hill, E.C.4.—Leaflet No. 0333, dealing with a 6-in. exhaust fan just placed on the market.

The Hop Bine Hotel, Wembley, the first building to be floodlighted in colour by the new G.E.C. gaseous discharge lamps

Troughton & Young, Ltd., 143, Knightsbridge, S.W.1.—An illustrated catalogue of "Ultralux" utility lighting fittings.

Mavor & Coulson, Ltd., 47, Broad Street, Glasgow.—A leaflet (No. 10a) on the new M. and C. face belt conveyor.

Bankruptcy Proceedings

L. G. H. Cantle, electrical engineer, Woodberry Cottage, Woodland Grove, Oatlands Park, Weybridge.—First and final dividend of 20s. in the £, payable April 20th at 133-139, Finsbury Pavement, E.C.

A. E. Bowen, electrical engineer, 103, Market Street, Dalton-in-Furness.—Receiving order made April 10th on debtor's own petition. First meeting to-day (Friday) at 16, Cornwallis Street, Barrow-in-Furness. Public examination May 12th at the Magistrates' Court, Barrow-in-Furness.

Revo footballers and their trophy

D. Boulton, radio and electrical engineer, Old Town Avenue, Plymouth.—First meeting to-day (Friday) at 11, St. Aubyn Street, Devonport. Public examination May 12th at the Western Law Courts, Plymouth.

J. E. Rodgers, electrical engineer, 134, Montrose Avenue, Welling.—First meeting April 28th at 280a, High Street, Rochester. Public examination May 15th at the Court House, Rochester.

E. Gould (Gould & Co.), electrical and radio engineer, High Street, Lee-on-the-Solent.—First and final dividend of 1s. 4d. in the £, payable April 28th at 87, High Street, Portsmouth.

H. L. Smith, electrical engineer, Sidmouth.—Application was made at Exeter County Court on April 12th for this debtor's discharge from bankruptcy. The Official Receiver pointed out that the applicant, who was adjudicated bankrupt in March last year, had paid 1¾d. in the £ dividend in another bankruptcy and nothing in respect of that for which application for discharge was now being made. The discharge was refused.

Company Liquidations

Rotax, Ltd.—Winding up voluntarily. Liquidator, Mr. C. H. Smith, 84, Colmore Row, Birmingham.

Julian & Sons, Ltd.—Winding up voluntarily. Liquidator, Mr. L. Craddock, The Market Place, Reading.

Eastern Electric Installation Co., Ltd.—Particulars of claims by April 25th to the liquidator, Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C.

Electricity Supply

Lighting, Domestic, Power

Anstruther (Fife).—ELECTRIC LIGHTING FOR WAID ACADEMY.—Electric lighting is to be installed by the Fife Education Committee in Waid Academy.

Batley.—CORRECTION.—In our last week's note concerning the new domestic tariff approved by the Town Council we gave the "unit" charge as 3d. Mr. P. M. Maxwell, the borough electrical engineer, points out that this should have been ¾d.

Bedford.—SUPPLIES TO BRICKWORKS.—An additional cable costing £1,745 is to be laid by the Electricity Department from Wootton to the works of the Marston Valley Brick Co., Ltd., and mains are to be extended to the Elstow brickworks of the London Brick Co. & Forders, Ltd., at a cost of £640.

Bedwas and Machen.—REDUCED CHARGES.—Electricity charges have been reduced for lighting from 8d. to 6d. per kWh, and for heating from 3d. to 1½d.

Bingley.—RELIEF OF RATES.—The Electricity Department is relieving the rates for the ensuing year to the extent of £850.

BULK SUPPLY.—The Urban District Council has given notice to the Keighley Corporation to terminate the present agreement for a bulk supply of electricity from that authority. The Bingley Council has two alternative sources of supply, and, failing agreement, a change may be made.

Bridlington.—ELECTRICITY FOR SEWERBY-CUM-MARTON.—The Town Council is to apply for an Order to supply electricity to premises in the Parish of Sewerby-cum-Marton at present included in the area of the Buckrose Light & Power Co., Ltd., with a proviso that, if the Corporation boundaries are not extended so as to include this parish, the mains, switchgear, &c., are to be taken over by the company at cost price. The Council is also to quote terms for a bulk supply of electricity to the Buckrose Company to enable the latter to supply the parish of Flamborough.

Brownhills.—CHEAPER ELECTRICITY.—The Cannock Chase Colliery Co., Ltd., which provides electricity in Brownhills, has reduced the lighting flat rate from 7d. to 6½d. per kWh and the "unit" charge of the two-part tariff based on the rateable value from 2d. to 1½d. Prepayment-meter charges are reduced from 8d. and 9d. to 7½d. and 8½d. per kWh.

Brynamman.—SPECIAL ORDER.—The Electricity Commissioners have submitted to the Minister of Transport for confirmation a Special Order made by them authorising the

Experiments in colour floodlighting are now being carried out at the new Freemasons' Hall, Great Queen Street, London, which will be opened shortly

Brynamman & District Electric Supply Co., Ltd., to supply electricity in part of the Llandilo Fawr rural district.

Burton-on-Trent.—PREPARATIONS FOR INCREASING LOAD.—To cope with the rapidly increasing load in the Uxbridge Street district, additional mains are to be laid and transformers installed at an estimated cost of £8,820.

EXTENSIONS.—A supply is to be given to premises in Burton Road, Tutbury, at a cost of approximately £525.

Buxton.—REDUCED CHARGES.—The following revised charges for electricity have been approved by the Electricity Committee:—Lighting, flat rate: First 100 kWh, per quarter, 5½d. per kWh (instead of 6d.); next 1,000 kWh, 4½d. (5d.); above 1,000 kWh, 3½d. (4d.). Two-rate systems for (a) hotels, restaurants, and business premises, and (b) private residences: Special charges during certain periods of the day, with 2½d. per kWh (2½d.) for the remainder of the time. Lighting through prepayment meters: Discount increased from 1½d. to 2d. in the shilling. Late shop window lighting and outdoor signs: 2½d. (2½d.). Power, heating, and cooking: Summer quarters, 1d. (same); winter quarters, first 200 kWh, 1½d.; next 300 kWh, 1¼d.; above 500 kWh, per quarter, 1d.; by prepayment meter, 2d. Water and tubular heating, ¾d. Industrial power: Special maximum demand and two-rate tariff. All-in domestic tariff: The rateable value charge instead of being 15 per cent. for all premises will be 15 per cent. on first £60, 12½ per cent. on next £60, and 10 per cent. after £120 (minimum charge, £3); "unit" charge, ¾d.

Canada.—THE ABITIBI SCHEME.—The Ontario Government has taken over from the Ontario Power Service Corporation the Abitibi Canyon power development in Northern Ontario. The Power Service Corporation was unable to proceed with the project owing to financial difficulties, so the assets of the Corporation, including the power development, were offered for sale; the Ontario Hydro-Electric Power Commission was the only tenderer, at $14,000,000.

Cardiff.—EXTENSIONS.—The Electricity Committee is to erect a sub-station in Milton Street Yard at a cost of £2,000, and extend mains at a cost of £1,857.

Carlisle.—GREAT CORBY WANTS ELECTRICITY.—The Electricity Committee has received a petition from residents in Great Corby asking for electricity at an early date, but has deferred consideration of the matter until the engineer has reported with regard to the electrical development of rural areas suggested by the Electricity Commissioners.

Clacton-on-Sea.—STREET LIGHTING.—The Urban District Council has applied for sanction to a loan of £1,210 for central lighting in High Street, Carnarvon Road and Wellesley Road.

Crediton.—RURAL EXTENSIONS.—The Exe Valley Electricity Co. has informed the Rural District Council that steps are being taken to provide a supply of electricity for Newton St. Cyres by the end of the summer. A local company has informed the Council that it has decided to apply for the Council's consent to a Special Order to supply electricity to Cheriton Fitzpaine, but is reluctant to proceed with the installation of plant to meet the increased demand without receiving some security of tenure. This matter has been left in the hands of the clerk. Cheriton Fitzpaine is in the compulsory area of the Exe Valley Electricity Co.

Crieff.—ELECTRICITY PREFERRED.—A proposal to scrap electric street lighting and revert to gas was defeated at a recent meeting of the Town Council.

Cumberland.—ELECTRICAL PROGRESS.—Good headway is being made with its electrical grid scheme by the Mid-Cumberland Electricity Supply Co., Ltd., whose supply area embraces 850 sq. miles including the entire coast of Cumberland. The company has erected 20 miles of 11,000-V line and is supplying electricity to Cockermouth, Brigham, Greysouthen, Bridgefoot and Great Clifton, and it will shortly extend its activities to Maryport, Papcastle, Flimby, Dearham, Bridekirk, Little Clifton, and Stainburn. Mr. R. E. Gamlen, the company's district manager, states that there has been a good demand for electricity in the area. Farmers are installing electrical machinery and there has been an encouraging demand for electric cooking appliances. The company is introducing an assisted wiring scheme whereby consumers can spread the cost of wiring over a period of five years.

Darlington.—ASSISTED WIRING.—An assisted wiring scheme has been adopted by the Darlington Corporation for domestic consumers. Residents will be able to secure competitive tenders from private contractors and the Electricity Committee will arrange for the payment of the amount by quarterly instalments added to the accounts for energy consumed.

Dumfries.—CONSUMERS' GUARANTEES.—The County Council has approved a recommendation to impose a guarantee of 7 per cent. on consumers where the revenue from the line for each year is less than 7 per cent. of the capital cost.

Dundee.—LIGHTING OF CITY SQUARE.—The Works and Public Lighting Committees have approved a scheme for lighting the new city square.

Durham.—SCHOOL LIGHTING.—The Board of Education has refused to sanction the expenditure on installing electric lighting in schools in the Stanley area.

East Devon.—SPECIAL ORDER.—The East Devon Electricity Co., Ltd., has applied to the Electricity Commissioners for a Special Order authorising it to extend its supply area so as to include the Budleigh Salterton rural district, and also to empower the company to purchase the undertaking of the Budleigh Salterton Electric Light & Power Co., Ltd.

Eccles.—EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £1,959, and erect a transformer kiosk at Monton Green (£1,232).

Fleetwood.—PRICE REDUCTIONS.—The Urban District Council has confirmed reductions in electricity charges affecting all consumers.

Glasgow.—MAINS EXTENSIONS.—The Electricity Committee is to lay distributing mains at a cost of £1,073.

Hampton.—EXTENSIONS.—The London and Home Counties Joint Electricity Authority proposes to give a supply of electricity in the Hanworth Road and Buckingham Road area.

Hastings.—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £15,000 for house services.

Hyde.—STREET LIGHTING.—The Highways Committee has arranged for the lighting of portions of Dukenfield Road and George Street by electricity.

NEW SUB-STATION.—The Joint Electricity Board is to erect a sub-station in Knott Lane.

India.—ELECTRICAL DEVELOPMENT IN MADRAS.—The inauguration was performed recently by Sir George Stanley, the Governor of Madras, of the Pykara hydro-electric scheme. According to *The Times*, it is calculated that the scheme will develop 32,700 h.p., at an estimated cost of Rs.120 lakhs (£900,000). The Governor said that when completed the project was expected to develop 90,000 h.p., and the financial prospects were hopeful, as already a large part of the output had been sold. He expressed the opinion that, besides industrialists, cultivators would speedily realise the value of electricity for domestic and farm use.

Inverness.—SUPPLY FOR ASYLUM.—The Asylum Committee has come to an agreement with the Town Council Electricity Committee for a supply of electricity to the asylum. It was pointed out that if the Asylum Committee took its supply from the Corporation the capital expenditure would be £12,000, but if it generated its own power the amount would be £18,000.

Japan.—ELECTRICAL DEVELOPMENTS.—The I.G.R. authorities have practically completed their investigations regarding the erection of a 25,500-kW power station costing 22,000,000 yen on the Tenryn River in connection with the Government's second railway electrification scheme. Both the Kanagawa and Yokohama Councils have hydro-electric schemes under consideration, and good progress is being made with a thermal power station in Shinkyo, Manchukuo.

Keighley.—MAINS EXTENSIONS.—The Electricity Committee is to lay a main in Rawling Street for completing the change-over from d.c. to a.c., and provide new mains at Woodhouse, Marsh (Oxenhope), Stanbury, and Oldfield at a total cost of £1,728. An h.p. cable is also to be laid from the Sutton sub-station to Holme Lane and a small sub-station installed at a cost of £656.

Kendal.—BULK SUPPLY FROM CENTRAL BOARD.—The Corporation is considering obtaining a bulk supply of electricity from the Central Electricity Board.

Kirkcaldy.—STREET LIGHTING.—The Town Council has decided to convert the lighting in St. Clair Street and Rosslyn Street from gas to electricity.

Lichfield.—LOANS SANCTIONED.—The City Council has received sanction to loans of £2,000 for mains and services, £2,000 for meters, and £3,000 for consumers' wiring installations.

SUPPLY EXTENSION.—An overhead line is to be erected to supply King's Bromley.

Manchester.—ELECTRICAL EQUIPMENT FOR COLLEGE.—The Education Committee has appointed a special sub-committee to consider the provision of equipment for the electrical engineering department and for the power house at the Manchester College of Technology.

Middlesbrough.—LOAN FOR EXTENSIONS.—The Town Council is to apply for sanction to borrow £48,000 in connection with the extension of the electricity services.

Norway.—NEW HYDRO-ELECTRIC STATION.—A new hydro-electric central station is in course of construction in the Trael Valley, near Narvik, for the supply of power to the last-mentioned town and to the electrified sections of the Ofoten railway. The plant, which will utilise the water of the River Nygard by means of three dams, will eventually comprise two turbines coupled to single-phase generators and three three-phase sets, but so far only the two 12,000-h.p. single-phase and one of the 11,500-h.p. three-phase units have been installed.

Norwich.—CHEAPER ELECTRICITY.—Reductions in electricity charges have been made as follows:—Domestic lighting: From 5½d. to 5d. in Norwich, and from 7d. to 6d. in the fringe area. Similar reductions have been made for the lighting of business premises. Small power supplies: First 1,000 kWh, per quarter, 1½d.; above, 1¼d. Large power supplies for consumers of at least 6,000 kWh, per quarter: First 6,000 kWh, 1¼d.; above, 1d. The two-part tariff for l.p. supplies for large installations has also been reduced and simplified.

Nottingham.—RELIEF OF RATES.—A sum of £31,500 is to be allocated from the profits of the Electricity Department for the relief of the rates. It is expected that the Department will show a surplus this year of between £70,000 and £80,000.

Paisley.—NEW METERS.—The borough electrical engineer has been authorised to purchase 1,000 prepayment meters.

Peterborough.—EXTENSIONS.—Electricity supplies are to be provided in Eastrea and Coates at a cost of £2,750.

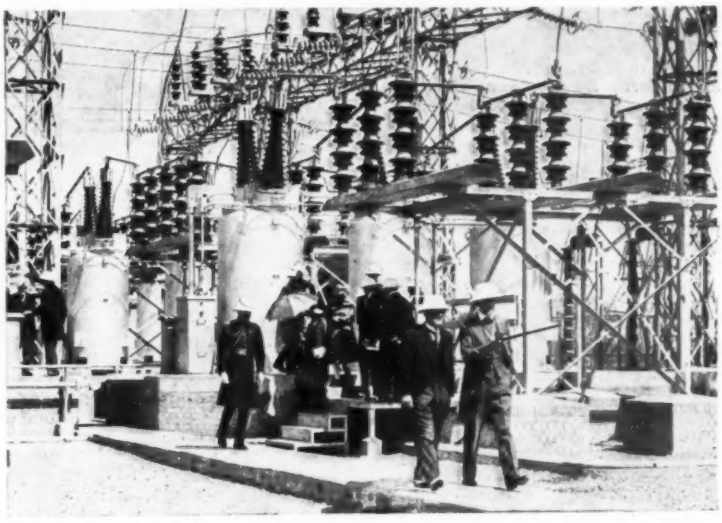
Portland.—EXTENSIONS.—The Electricity Committee is to give a supply of electricity to premises belonging to the South Western Stone Co., Ltd., at Perryfield.

Scarborough.—NEW CABLE.—The Electricity Committee is to lay a new e.h.p. feeder cable from the electricity works in Seamer Road to the Falconer's Road sub-station at a cost of £3,180.

A FURTHER CONCESSION.—Electricity for industrial heating purposes and water heating at premises where no power, heat, or illuminant is used other than electricity is to be charged for at ¼d. per kWh.

South Shields.—WHITBURN SUPPLIES.—The question of supplying electricity to the added portion of Whitburn is being considered by the Town Council.

MAINS AND SERVICES.—Sanction to borrowing of £10,000 for mains and £10,000 for services has been received.



The Viceroy of India, Lord Willingdon, on a tour of inspection at Shalimar after inaugurating the Punjab hydro-electric scheme which provides electricity by utilising the waters of the River Uhl

South Wales.—SPECIAL ORDER.—The Electricity Commissioners have submitted to the Minister of Transport for confirmation a Special Order made by them authorising the West Cambrian Power Co., Ltd., to supply electricity in parts of the counties of Pembroke, Cardigan, and Carmarthen.

Sutton Coldfield.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains in Queslett Road and Clarence Road at a cost of £850.

Sweden.—INCREASED PROFITS FROM WATER POWER.—The Swedish Government Waterfalls Department reports that, after reserving 4.48 million kroner for the renewal fund, there was a surplus for 1932 of 16.28 million kroner, against 16.17 million for 1931. This corresponds to an interest of 4.83 per cent. on the working capital invested by the Government during the past year.

Switzerland.—POWER PRODUCTION DURING 1932.—A return issued by the Office Fédéral de l'Economic Electrique et l'Union de Centrales Suisses de l'Electricité shows that the output of electricity in Switzerland last year amounted to 3,679.1 million kWh, as compared with 3,722 million kWh in 1931. Last year's total, with the figures for the preceding twelve months in parentheses, was made up as follows: Hydro-electric stations, 3,679.1 million kWh (3,722); steam and internal-combustion-engine plants, 10.8 million kWh (5.5); and Swiss Federal Railway generating stations, 68.6 million kWh (100.6). In addition 9.6 million kWh (5.8) was "imported" from adjoining countries.

NEW HYDRO-ELECTRIC STATION.—A new hydro-electric power station known as the Piottino has recently been completed by the Société Officine Elettriche Ticinesi, at Bodio, to utilise the water power of the River Tessin. The plant will have an ultimate capacity of 62,500 kW, and the plant so far installed comprises two 24,000-kW Francis-type turbines directly coupled to 8,200-V generators.

Tamworth.—OVERHEAD LINES.—The construction of an overhead line from Clifton Campville to Hounton, Edingale, and Harlaston is proposed by the Tamworth District Electric Supply Co., Ltd.

Taunton.—LARGE INCREASE IN GENERATION.—During the year ended March 31st last electricity generated at the Corporation's power station amounted to 6,533,658 kWh, which compares with 5,402,220 kWh in 1931-32. The cost of fuel per kWh generated last year was 0.245d. as against 0.285d. (a saving of 14 per cent.), while the fuel per kWh generated was lowered from 2.23 lb. to 2.086 lb. (a saving of 6 per cent.).

RURAL ELECTRIFICATION SCHEME.—The Town Council has approved a scheme for the reorganisation and extension of the electrical transmission and distribution systems in the urban and rural districts at an estimated cost of £20,000. The

scheme, which has as its main object the development of the rural supply is expected to be completed in three years.

Uckfield.—EXTENSIONS.—The Weald Electricity Supply Co., Ltd., has informed the Rural District Council that there are now sufficient applications to justify an extension of the mains in Ghyll Road, Waldron.

United States.—THE MUSCLE SHOALS SCHEME.—President Roosevelt has requested Congress to authorise the rehabilitation of the Muscle Shoals power and nitrate plant as part of the scheme to develop the Tennessee Valley.—*Reuter* (Washington).

Walton-on-Thames.—FURTHER PRICE REDUCTIONS.—In addition to the reductions in lighting and heating charges reported in our last week's issue, the Urban District Council announces a reduction in the fixed floor area charge in connection with the residential alternative tariff by 25 per cent., and the "unit" charge from ¾d. to ¾d. The power rate has also been reduced from 3d. per kWh for the first 2,000 kWh per quarter to 2½d., with a sliding scale down to 1d.

Warrington.—ASSISTED WIRING SCHEME.—A report was submitted at a recent meeting of the Electricity Committee on the allocation of work under the assisted wiring scheme, and the town clerk was asked to circularise contractors with regard to the methods adopted by canvassers.

Watford.—AGREEMENT WITH CENTRAL BOARD.—It was reported at a recent meeting of the Electricity Committee with regard to the proposal to make Watford generating station a "selected" station that a large measure of agreement had been arrived at, but that there were still two or three points outstanding. The negotiations are continuing.

REVOCATION OF FRINGE ORDER.—An application has been considered from the Colne Valley Electric Supply Co., Ltd., asking that the Fringe Order obtained by the Corporation in 1926 should be revoked, as the company now wished to supply the consumers concerned, and the town clerk has been instructed to settle the terms of the Revocation Order.

SUPPLY TO PENMEN'S GREEN.—The Electricity Committee recommends the approval of an application by the Chesham Electric Light & Power Co., Ltd., for a Fringe Order to supply premises in Penmen's Green.

Wick.—ELECTRICITY INQUIRY.—Mr. H. Nimmo, chief engineering inspector to the Electricity Commissioners, is to hold the public inquiry into the administration of the Electricity Department on May 3rd.

Wigton (Cumberland).—THE ELECTRICITY SCHEME.—The electricity scheme for the area was discussed at a recent meeting of the Urban District Council. Asked if the prices fixed for electricity were to be as previously arranged by a Committee of the Council, the chairman stated that in the Draft Order the prices laid down were 8d. per kWh for domestic lighting and 3d. for power, but the Council had refused to agree to the Order on the grounds of insufficient compulsory mains and too high prices. The matter had, however, since been settled to the Council's satisfaction, it being agreed to make a reduction of 1d. in electricity charges both for domestic and power purposes.

Traction

Glasgow.—ELECTRIFICATION OF SUBWAY.—The Corporation decided last week by a large majority to proceed with the scheme for electrifying the Subway at an estimated cost of £94,000.

London.—INCREASED SPEED LIMITS FOR TRAMS.—The Ministry of Transport is seeking the views of London local authorities upon an application by the London County Council for increased speed limits on its tramways. The Ministry points out that low speeds were originally imposed with a view to safety in localities where traffic is at times congested. The general speed authorised for the L.C.C. Tramways is at present 16 m.p.h., with only one or two portions of route where 20 m.p.h. is authorised; but there are a very large number of localities where speeds are limited to 12 and 8 m.p.h. and some to 6 and 4 m.p.h. Since the passing of the Road Traffic Act with a limit of 30 m.p.h. for buses, and the general increase in speed which has arisen therefrom, it has been represented by the tramway authorities that many of the existing low speeds for tramways are an unnecessary handicap and a very material factor in checking the general flow of traffic, thus adding to the congestion of the streets. Apart from this it is a matter of common knowledge that in certain cases the speed limits are disregarded without material diminution of safety. It has therefore been decided that a general increase of tramway speeds is desirable, and that the principles embodied in the Road Traffic Act of making a driver responsible for driving at a safe speed having regard to traffic and other conditions should also be applied to tram drivers.

THE TRANSPORT ACT PASSED.—The Royal Assent was given to the London Passenger Transport Act last week.

RAILWAY ELECTRIFICATION.—In the House of Commons on April 12th, Captain Erskine-Bolst asked the Minister of Transport if he could state what progress it was probable would be made towards implementing the recommendations of the Weir Committee on the electrification of railways during the current year. Mr. Stanley said he understood that the railway companies were pursuing investigations into the problem of the main line electrification in the light of the Weir Report, and they had informed him that when the London Passenger Transport Bill had become law they would be prepared to submit to the Standing Joint Committee of the Transport Board and the railway companies, which the Bill proposed to set up, certain schemes relating to the electrification of London suburban railways.

Torquay.—TROLLEY-BUS POLL.—The result of a recent postcard poll regarding the proposal to introduce trolley-buses is as follows: Number of postcards sent out, 22,490; total number returned, 14,588. Votes recorded in reply to question—"Are you in favour of trolley buses for Torquay?": Yes, 2,985; no, 11,194; neutral, 362, doubtful, 47. Votes recorded in reply to question—"Are you in favour of the Corporation purchasing the tramways undertakings?": Yes, 4,214; no, 9,935; neutral, 387; doubtful, 52.

Communications

Australia.—WIRELESS TELEPHONY.—Of the 116 wireless telephone calls made between Australia and other countries during February, seventy-five originated in Australia. The number exceeds those made for any month since the service was inaugurated in 1930. Fifty-two calls were put through to Great Britain by the Commonwealth, at a cost of £6 for three minutes and £2 for each additional minute, and Great Britain replied with forty-three calls. Twelve calls at the rate of £9 for the first three minutes were made by Australia to the United States, which responded with two calls the other way. Australia also telephoned France four times, and Ireland, Germany, and Switzerland once each.—*Reuter* (Melbourne).

Dorchester.—RADIO AERIALS.—The Dorchester Corporation Housing Committee has reported that some tenants in Cambridge Road have attached wireless aerials to the chimney pots of their premises and have not removed them in spite of several requests by the borough surveyor. The surveyor has been instructed to give forty-eight hours' notice to these persons that, unless the aerials are removed, the Council will itself remove the wires and charge the tenants with the expenses incurred.

Germany.—RADIO LICENCES.—On March 1st the number of broadcast radio receiver licences in use was 4,480,251, an increase of 52,651 since February. Of that total, 551,693 were free licences, an increase of 17,446 since February.

Great Britain.—RADIO LICENCES.—At the end of March the number of broadcast radio receiving licences in use was 5,498,700, representing an increase of 71,000 on the previous month's figure.

RADIO RELAY EXCHANGES.—The Scarborough Corporation Streets Committee is to consider applications for permission to operate a relay service in the borough and a proposal to use the existing underground electricity mains.

The Ayrshire Wireless Service, Ltd., Kilmarnock, with the approval of the Cumnock Town Council, is to install a relay system for subscribers in Council houses.

The Accrington Corporation Electricity and Highways and General Works Sub-Committee is framing draft conditions and regulations relating to wireless relay services, and it has agreed to invite tenders for the installation and working of relay services in the borough, the tenderers to have six weeks in which to submit their tenders.

The Wakefield Corporation has approved the assignment of the benefit of the service agreements to the Wireless Relay Services, Ltd.

The Rotherham Corporation Highways Committee has refused to grant Clear Radio, Ltd., permission to erect overhead wires across various roads.

London.—POST OFFICE REVENUE.—Speaking at the Chamber of Commerce, Nottingham, recently, the Postmaster-General said that in the financial year just ended there had been a loss of £800,000 on the telegraph service and a profit of £500,000 on the telephone service. In the latter months of the year the rate of decline of telegraph revenue had slowed down, and actually in January and February the public inland telegraph service showed an increase. Telephone revenue showed an increase which, although not so large as he had hoped, was not unsatisfactory.

U.S.A.—A RADIO RECEIVER CENSUS.—A nation-wide survey of the number of wireless receiving sets in use on January 1st, 1933, has just been completed. In 1930 some 12,078,345 homes, or 40.3 per cent. of the total, owned a receiver. The present survey shows a total of 16,809,562, or 56.2 per cent. On the basis of the official figure of 3.6 persons per family, the potential wireless audience of the country is about 60,500,000 people. According to trade reports, says *World Radio*, nearly 9,000,000 receivers have been sold in the past three years, more than half of them representing a new market, and dealers have reported consistently good sales in spite of the acute depression. The lowered purchasing power of the population has been offset by the development of "midget" sets at extremely low prices. New York State, with a total of 2,500,723, continues to show the greatest number of homes with receiving sets. In the proportion of homes owning a receiver to the total number, the district of Columbia (Washington, D.C.) heads the list with 88.7 per cent., followed by New Jersey with 83.1 per cent. Rhode Island, which stood first in the 1930 census, is now third with 82.1 per cent. In twenty-eight states half the total number of families now possess a wireless set.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—June 7th. City Council. One of two boiler units. (G. 12425.)*

May 23rd. Posts and Telegraphs Department. Submarine cables (A.X. 11763)*, telephone protective apparatus (A.X. 11764)*, and v.i.r. lead covered cable (A.X. 11765)*

SYDNEY.—June 14th. N.S.W. Department of Railways. 500-kW turbo-alternator for Zarra Street power station. (A.X. 11762.)*

Barmouth.—April 24th. Urban District Council. Laying of distribution cable for public lighting, &c. (April 14th.)

Cardiff.—May 16th. Electricity Department. E.h.p. and l.p. paper-insulated cables. (See this issue.)

Deptford.—May 3rd. Town Council. Lamps. (March 31st.)

Dumfries.—April 29th. County Council. House service meters. (April 7th.)

May 8th. Transformers. (See this issue.)

Egypt.—CAIRO.—May 15th. Ministry of the Interior. Waterworks equipment. (G.X. 12464.)*

Exmouth.—April 26th. Urban District Council. Electric lighting installation at the Pavilion on the Esplanade. Mr. Samuel Hutton, engineer and surveyor.

Fife.—April 24th. County Council. Various works, including electric lighting, at fifty-two houses at Wemyss. Mr. G. B. Deas, Central Chambers, Kirkcaldy.

Folkestone.—Town Council. Electric wiring installation in thirty-two houses. Borough engineer.

Glasgow.—April 24th. Electricity Department. Cables, flexibles, meters, and cable covering tiles. (April 7th.)

April 24th. Electric lighting installation at Balmore Road housing scheme extension. General manager, Electricity Department, 75, Waterloo Street.

Halifax.—May 1st. Corporation. Electrical work in connection with out-station house. Mr. D. T. Lloyd Jones, borough engineer, Crossley Street, Halifax (deposit £1 1s.).

Hamilton.—April 29th. Corporation. Wiring and fittings for lighting and heating of the Mausoleum Cottage, Palace Grounds, Hamilton. Town clerk.

Electricity Department. 500-kVA transformer. (See this issue.)

India.—LAHORE.—May 1st. North Western Railway. Welding electrodes. (A.X. 11768.)*

Kirkcudbright.—May 17th. County Council. 11-kV overhead and underground distribution lines. (See this issue.)

Liverpool.—April 26th. Corporation. Cables, compounds, and tapes for street mains. (April 7th.)

April 24th. Generating plant. (April 7th.)

London.—LONDON AND HOME COUNTIES JOINT ELECTRICITY AUTHORITY.—April 26th. Meters, transformers, and cables. (April 7th.)

HOLBORN.—May 16th. Borough Council. Automatic traffic control signals. (April 14th.)

ST. MARYLEBONE.—May 2nd. Electricity Department. L.p. and e.h.p. underground cables. (See this issue.)

Manchester.—May 5th. Electricity Department. Supervisory control gear and boiler house vacuum cleaning plant. (April 14th.)

Middlesbrough.—May 3rd. Electricity Department. Cables and meters. (See this issue.)

New Zealand.—WELLINGTON.—June 6th. Post and Telegraph Department. 100 miles of v.i.r. insulated wire. (A.X. 11770.)*

DUNEDIN.—May 24th. Corporation Tramways. 380 yd. of feeder cable. (A.X. 11769.)*

Oswestry.—April 29th. Electricity Department. L.p. distributors. (See this issue.)

Salford.—May 1st. Electricity Department. Transformer and metal-clad switchgear panels. (April 7th.)

South Africa.—JOHANNESBURG.—May 5th. Government Supplies Board. 2¼ miles of telephone cable and 1,280 miles of insulated wire. (A.X. 11761.)*

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Aldershot.—Town Council. Accepted. Wiring council houses for electric lighting (£137).—W. H. Tordoff.

Bedford.—Electricity Committee. Recommended. Joint boxes for twelve months.—Siemens Bros. & Co., Ltd. 3,500-kVA transformer and equipment (£906).—English Electric Co., Ltd. Five truck type switchgear requipments (£693).—British Thomson-Houston Co., Ltd.

Cardiff.—Hospital Committee. Accepted. X-ray equipment for Llandough Hospital (£2.042).—Watson & Sons (Electro-Medical), Ltd.

Transport Committee. Accepted. Six miles of trolley wire (£452).—Frederick Smith & Co., Ltd.

Dartford.—Electricity Committee. Recommended. Installations under assisted scheme (£2 8s. 6d. for four lighting points. 12s. 6d. for extra points, 9s. per plug point).—E. E. Beaven. Rectifier plant (£3,582).—Hewittic Electric Co., Ltd. Switch panel and switchboard (£785).—A. Reyrolle & Co., Ltd.

Douglas (I.O.M.).—Electricity Committee. Accepted. Time switches.—Venner Time Switches, Ltd. 50-kVA transformer.—Brush Electrical Engineering Co., Ltd.

Ealing.—Town Council. Accepted. Switchgear and induction regulators (£26,003).—English Electric Co., Ltd. Transformers (£6,460).—Ferranti, Ltd.

Gillingham.—Electricity Committee. Recommended. Switchgear (£1,403).—A. Reyrolle & Co., Ltd.

The borough electrical engineer reported that he would shortly require additional switchgear and would inform the company that the Council would expect it to tender for the same upon the basis of the tender now submitted.

Glasgow.—Municipal Transport Committee. Accepted. Lead-covered cable.—Hackbridge Cable Co., Ltd.; Standard Telephones & Cables, Ltd. Trolley wire.—W. F. Dennis, Ltd. (representing Felten & Guilleaume, Germany). Piping for Pinkston.—Babcock & Wilcox, Ltd.

Police Committee. Accepted. Street lanterns required by the Lighting Department.—Simplex Electric Co., Ltd.

Electricity Committee. Accepted. Plant in connection with the change of frequency. Forty-five transformers, reconditioned (£6,753).—British Electric Transformer Co., Ltd. Fourteen transformers, reconditioned (£1,453).—Bruce Peebles Co. Two transformers, reconditioned (£900).—English Electric Co., Ltd.

Hyde.—Baths Committee. Accepted. Electric lighting improvements at baths.—Johnson & Turner, Ltd.

A simple yet original window display at the Metropolitan-Vickers Electrical Co.'s premises at Crown House, Aldwych, London

London.—FULHAM.—Electricity Committee. Recommended. Structural steelwork for first section of power station (£383,616).—Dorman, Long & Co., Ltd.

SHOREDITCH.—Electricity Committee. Recommended. Reconditioning battery, Whiston Street power station (£159).—D. P. Battery Co.

Lowestoft.—Highways Committee. Accepted. Automatic traffic signals at Mutford Lock bridge (£57).—Revo Electric Co., Ltd.

Electricity Committee. Accepted. Two kiosks (£764).—Metropolitan-Vickers Electrical Co., Ltd. Cables (£690).—Callender's Cable & Construction Co., Ltd.

Scarborough.—Electricity Committee. Accepted. Kiosk and transformer (£376).—Metropolitan-Vickers Electrical Co., Ltd.

Whitby.—Urban District Council. Accepted. Supplies for one year.—Small cables and cut-outs.—W. T. Henley's Telegraph Works Co., Ltd. Main cables and service boxes.—Callenders' Cable & Construction Co., Ltd. Meters.—Robert Hornby & Co., Ltd. Lamps.—General Electric Co., Ltd.

Forthcoming Events

Association of Mining Electrical Engineers.—(*South Wales Branch*).—Saturday, April 22nd. South Wales Institute of Engineering, Cardiff. 6 p.m. Discussion on H.M. Electrical Inspector's Report, 1931.

Institute of Marine Engineers.—Tuesday, April 25th. Institute, London. 6 p.m. "Some Developments in British Oil Engine Design." Mr. W. S. Burn.

Diesel Engine Users' Association.—Wednesday, April 26th. Caxton Hall, Westminster, S.W. 3.30 p.m. "The Vibration of Engines." Mr. P. Jackson.

Institution of Electrical Engineers.—Thursday, April 27th. Institution, London. 6 p.m. Twenty-fourth Kelvin Lecture. "The Travel of Wireless Waves." Sir Frank E. Smith. (*London Students' Section*).—Friday, April 21st. Institution, London. 6.15 p.m. "The High-Voltage Circuit Breaker and its Competitor, the High-Voltage Fuse." Mr. W. D. D. Fenton. Saturday, April 22nd. 3 p.m. Visit to m.v. *Highland Brigade* at the London Docks. (*South Midland Students' Section*).—Tuesday, April 25th. University, Birmingham. 7 p.m. Annual meeting. "Automatic Sub-Stations." Mr. W. F. Baker. Wednesday, April 26th. 2.45 p.m. Visit to the works of Messrs. Joseph Lucas, Ltd.

Notes

A Red Rose as Wayleave Rent

Mr. Arthur Mee writes to *The Times* to say that the youngest red rose in the English rent-roll appears in the record of the Central Electricity Board. The first rose as rent for an electric cable was paid to him last June for the right to carry the cable under his drive at Eynsford Hill, Kent, and the red, red rose was brought to him by the daughter of the manager of the West Kent Electric Co., little Margaret Allbright.

Overhead-line Wayleaves

Mr. W. G. Paton, general manager of the North Wales Power Co., in a memorandum to the North Wales and South Cheshire Joint Electricity Authority, dealing with the objections to the erection of overhead lines, states that, as a result of the high rentals asked for wayleaves, negotiations were protracted, development was held up, and greater expenses were incurred, all of which must militate against the endeavours to bring down the price of electricity. The Dolgelly-Barmouth line, he says, has been delayed for about eighteen months, and the Pwllheli-Abersock line has been held up for about twelve months. The Barmouth line, which should have been completed last winter, would not be completed before July. The opposition was far greater now than in the early days of development, and demands for compensation were excessive. Mr. Paton cites an instance of £100 being demanded for the right of placing two poles in a hedgerow, while other demands varied from £6 15s. to £10 for the same privilege. Not only were they being required to pay compensation to landowners, but wayleave rentals were being demanded by the tenant occupiers of the land as well. Mr. Paton adds that it is only fair to state that the relations between the Power Company, the Distribution Company, and the majority of landowners and farmers in the area are exceptionally good, and in the majority of cases the companies have been treated fairly. As the Incorporated Association of Power Companies has already arranged a conference in London with a view to standardising the rentals throughout the country, the Joint Authority has decided to await the result of that conference before calling a meeting of the interested parties in North Wales.

Distinguished visitors to the Met.-Vickers Trafford Park Works

Left to right: Major A. L. Chandler (managing director, W. T. Glover and Co., Ltd.); Messrs. W. E. Clucas (treasurer, Manchester Chamber of Commerce) and A. P. M. Fleming (director, Research and Education Dept., M.-V. Co.); Sir Edward T. F. Crowe (Comptroller-General, Department of Overseas Trade); Messrs. J. Wolstenholme (chairman, Charles Walmsley and Co., Ltd.), G. E. Bailey (director, M.-V. Co.), Ald. W. Walker (Lord Mayor of Manchester); Messrs. E. H. W. Cooke (comptroller, M.-V. Co.), R. Bond (president, Manchester Chamber of Commerce), J. S. Peck (director, M.-V. Co.), P. S. Turner (director, M.-V. Co.), C. S. Taylor (chief engineer, Shanghai Power Co.), and R. Owen (secretary to Sir Edward Crowe).

Contributions to Benevolent Funds

We are informed by the Committee of Management of the I.E.E. Benevolent Fund that the Fund has benefited by the Electrical Engineers' Ball in February to the extent of £224, the surplus after defraying all expenses. The attendance at the ball was 760.

The fifth E.D.A. Carnival held in Newcastle in January has resulted in a profit of £96, of which £35 has been handed over to the I.E.E. Benevolent Fund, the balance going to the Electrical Industries Benevolent Association. During the past four years electrical charities have benefited to the extent of £324 18s. 5d. from this annual carnival.

Sign Rating in Glasgow

The Glasgow Valuation Appeal Court on April 10th considered two test appeals in connection with the exhibition of illuminated electric signs which the assessor proposed to include in his valuation. The principal appellants were Messrs. Macduff & Co., advertising contractors for the London, Midland and Scottish Railway Co. The other parties interested were the Scottish Co-operative Wholesale Society, the Franco-British Electrical Co., Ltd., the Imperial Tobacco Co., and Electro Illuminations, Ltd.

Mr. Macduff, for the advertising contractors, stated that his firm in 1932 entered into an agreement with the Imperial Tobacco Co. for the erection of a neon sign on the bridge carrying the L.M.S. railway over Argyle Street. Under that agreement the tobacco company agreed to pay £400 per annum for the granting to them by Macduff & Co. of the exclusive right of exhibiting the sign on the side of the bridge.

In the agreement the advertising contractors undertook to pay all rates and taxes payable in respect of the advertisement, with the exception of any rates or taxes levied by the Corporation of Glasgow as local authority, which rate, if levied, should be borne by the tobacco company. His firm had a similar agreement with the Scottish Co-operative Wholesale Society. Under that agreement the Society paid £900 per annum for permission to put the sign on the bridge. In the case of each of these signs the advertising contractors paid to the railway company 62½ per cent. of the receipts.

Mr. Cross, of the Imperial Tobacco Co., stated that the company's sign had been erected by Electro Illuminations, Ltd., and paid for by the tobacco company.

Mr. Kinnear (L.M.S. Railway Co.), gave evidence that the payments for the advertisements would be included in the accounts which would be before the railway assessessor. The subject would thus become liable under the railway valuation. Mr. John King, the railway assessor, corroborated this statement.

After hearing legal arguments the Court dismissed both appeals. The effect of the decision is that the electric sign on Jamaica Bridge should be entered on the burgh valuation roll at a value of £250, that the Franco-British Electrical Co., Ltd., be entered as proprietors, and the Scottish Co-operative Wholesale Society as tenants. In the second case the effect of the decision is that the sign on the bridge over Argyle Street should be entered in the valuation roll at £100, and that Electro Illuminations, Ltd., be entered as proprietors and the Imperial Tobacco Co. as tenants. Counsel for both companies asked for cases to be stated.

The I.E.E. Summer Meeting

It has already been announced that the I.E.E. summer meeting will take place in the area of the Western Centre from May 29th to June 2nd. The headquarters will be at Bath, and the meeting will include visits to Cardiff, Gloucester, Bristol, and Cheddar. The secretary of the Institution asks us to remind members who desire to take part but have not yet sent in their applications to do so without delay.

Appointments Vacant

Assistant electrical engineer for Fulham Borough Council.

Mechanical engineers as lieutenants in the Royal Army Ordnance Corps.

(See our classified advertisements.)

Makers' Names Wanted

DUM-DUM glazing compound.

FULMEN dynamo.

Agents in this country for the Electro-Magnetic Tool Co., Chicago, U.S.A.

Electrical plant suitable for the oxidisation of tin.

MAPPERLEY visual signal indicator.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Messrs. P. W. Davis and **John Huntington,** directors of the Simplex Electric Co., Ltd., have been appointed joint general managers of the company, and **Messrs. E. A. Edwards** and **F. W. Martin** have been elected to the board, the former as sales director. **Mr. H. F. McLoughlin** has resigned the position of governing director.

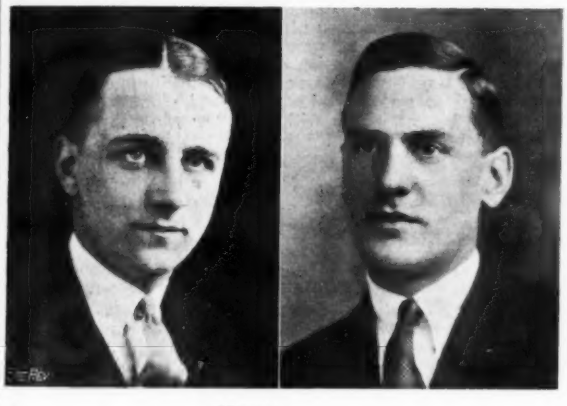
Mr. G. H. Bentley, mains construction engineer to the Metropolitan Electric Supply Co., Ltd., has retired under the "Metesco" pension fund after twenty-eight years' service. At a smoking concert held at the White Hart Hotel, Acton, on April 7th, Mr. Bentley was presented with a wallet and cheque and a pendant for Mrs. Bentley. The presentation was made by Major H. Richardson.

Mr. G. H. Bentley

Mr. F. Thursfield has moved to Hosey Acre, Westerham, Kent (telephone: Westerham 165).

Mr. E. G. Roberts is next week returning to Messrs. A. C. Hands and Sons, 57, Shoe Lane, E.C.4, to represent them in the same territory as that which he previously covered.

Mr. C. Gearing, formerly South Coast representative of Berry's Electric, Ltd., has been appointed to succeed Mr. N. Deykin, for many years Midland representative of the company, the latter having recently resigned. **Mr. W. L. White** has been transferred from the company's Manchester branch to the Midland area.



[Jerome

Mr. W. L. White and Mr. C. Gearing, of Berry's Electric, Ltd.

[T. J. Evans

Mr. Norman T. Smith

Mr. Norman T. Smith, A.M.I.E.E., who, as reported in our last issue, has been appointed engineer and manager to the Kirkcudbright County Council Electricity Department, received his training and experience with the Shropshire, Worcestershire & Staffordshire Electric Power Co., commencing as an apprentice. In 1920 he was appointed assistant district engineer for the Smethwick and Oldbury area of the company, and in 1926 he took up the position of district representative in its Ludlow and South Shropshire area.

Mr. J. Lindley Thompson, M.Sc., M.I.E.E., has resigned his position as chief engineer at Hayes to Messrs. Crompton Parkinson, Ltd., and **Mr. R. Weaving,** M.I.E.E., has been appointed to fill the position. The amalgamation and reorganisation of the transformer departments of Crompton Parkinson, Ltd., and the British Electric Transformer Co., Ltd., have now been completed, and the manufacture of transformers has been concentrated at the Hayes works of the B.E.T. Co.

Mr. T. Roles, chief electrical engineer of the Bradford electricity undertaking, has been elected chairman of the North Midland Area of the British Electrical Development Association for the third year in succession, and **Mr. C. Nelson Hefford,** chief electrical engineer to the Leeds Corporation, has been elected president of the Leeds Circle.

[Lafayette

Mr. T. Roles

Mr. Martin J. Insull, "free again under $5,000 bail," returned to his home in Orillia, Ontario, at the end of March, says the *Electrical World*, after the Supreme Court of Ontario adjourned indefinitely the application for his extradition to Chicago. The judge will study the depositions (on which deportation was refused) before a date is set for the resumption of the hearing.

Mr. F. H. Taylor points out, with reference to our recent note, that he has been in practice as a consulting engineer for over twenty-one years, and previously practised in Victoria Street, S.W.1, for about sixteen years.

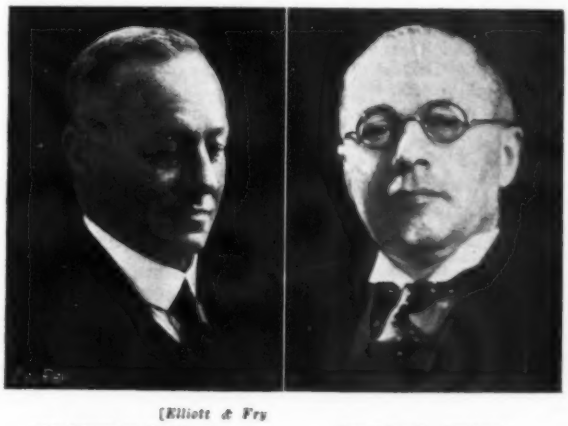
Mr. H. C. Spence, engineer and manager of the Holmfirth Urban District Council's Electricity Department, has been appointed deputy distribution engineer at Croydon. Mr. Spence received his training in the Dundee Corporation Electricity Department, and subsequently held appointments with the Glasgow Corporation Electricity Department and the Yorkshire Electric Power Co.

Mr. J. Pilling, B.Sc., of the Burnley Corporation Electricity Department, was married to Miss Annie Walton on April 12th.

Mr. J. J. McKenna, formerly of Domestic Electrification, Ltd., has been appointed by the English Electric Co., Ltd., as sales engineer for its domestic and heating section in the London area, and will operate from Queen's House, Kingsway, W.C. Mr. McKenna's experience in the electric heating and cooking industry extends over many years, and has covered the design, production and sale of all types of domestic electrical appliances.

Mr. C. Allsop, A.M.C.T., A.M.I.E.E., was married to Miss Margaret B. Johnstone at St. Cuthbert's Memorial Chapel, Edinburgh, on April 15th. Mr. Allsop is with Messrs. Bruce Peebles & Co., Ltd., as chief of transformer test.

Mr. W. F. Bishop and **Sir Maurice G. Simpson,** C.S.I., M.I.E.E., have been elected directors of Messrs. W. T. Henley's Telegraph Works Co., Ltd. Mr. Bishop joined the company as a junior in 1895, and has held the successive appointments of chief of the estimating department, sales manager and assistant general manager, and, upon the retirement of Mr. Percy Rosling, in March last year, succeeded him as general manager. Sir Maurice Simpson entered the Indian Telegraph Department in 1887, and became Electrical Engineer-in-Chief in 1906, retiring from India in 1914. He joined the Indo-European Telegraph Department of the India



[Elliott & Fry

Sir Maurice G. Simpson Mr. W. F. Bishop

Office in the following year, and since 1923 has held the position of Director-in-Chief. He was knighted in January, 1931.

Mr. G. G. Mallinson, A.M.I.E.E., has been appointed manager of Messrs. Johnson & Phillips' branch at 1, Eldon Square, Newcastle-on-Tyne. **Mr. W. S. Wilson,** M.I.E.E., M.I.N.A., will specialise in "J. & P." marine cables in the North-East Coast area.

Mr. J. Brierley, manager of the Wigan Corporation Transport Department, and Mrs. Brierley celebrated their silver wedding on April 11th, and entertained to dinner at the Grand Hotel, Wigan, representatives of the Transport Department. Mr. and Mrs. Brierley were presented with a combined silver barometer and clock to mark the occasion. Mr. Brierley went to Wigan in 1921, and had previously served with the Oldham, Rhondda and Southampton tramways.

Obituary

Mrs. Hopkinson.—Mrs. Evelyn Hopkinson, widow of Dr. John Hopkinson, F.R.S., and mother of the late Col. Bertram Hopkinson, C.M.G., F.R.S., and of Lady Ewing, died at Cambridge on April 17th in her eighty-third year.

Miss Gray.—Submarine cable men who still cherish pleasant memories of the early years at Silvertown will learn with the same measure of regret as we record the fact that Miss Bethia Aitken Gray, the only daughter of the late Matthew Gray, died on April 13th at Lessness Park, Abbey Wood, S.E.2, which was for so many years the family home. As stated in the ELECTRICAL REVIEW of November 4th last, Mr. Matthew Gray left five sons and one daughter. Miss Gray outlived the last of the sons (Mr. C. H. Gray) by less than six months.

Mr. M. J. Collins.—The death has occurred at a nursing home at Bournemouth of Mr. Maurice John Collins, aged sixty-eight years. Mr. Collins was a staff administrative officer with the Electricity Commission, having transferred from the Board of Trade when the Commission was set up. By virtue of his office under the Board of Trade he naturally possessed a wide knowledge of electricity supply matters. He retired from the service of the Commission in August, 1925.

Mr. J. S. D. Moffet.—The death occurred on April 13th, in hospital, of Mr. J. S. D. Moffet, general manager of the Salford Corporation Transport Department, at the age of fifty-nine years. Mr. Moffet had been with the Salford Corporation since 1923, and was previously tramway manager to the Belfast Corporation. A memorial service was held on April 15th at the Holy Angels' Church, Pendleton. Among those who attended were the Mayor and Mayoress of Salford, Alderman W. Greenwood (chairman) and members of the Transport Committee and a number of transport officials from the North of England. The interment took place on April 18th at Kyloe Church, Beal, Northumberland.

F. L. Rhodes.—The death is reported in the *Electrical World* of Mr. Frederick L. Rhodes, aged sixty-two. For forty years Mr. Rhodes had been an electrical engineer and international authority on telephony. He was in the service of the American Telephone & Telegraph Co. and its predecessor, the American Bell Telephone Co. He retired last year.

Mr. F. G. Kellaway.—The Rt. Hon. F. G. Kellaway, P.C., who died on April 13th at his home, The Lodge, Westerham, Kent, after a long illness, was vice-chairman and managing director of Marconi's Wireless Telegraph Co., Ltd., chairman and managing director of the Marconi International Marine Communication Co., Ltd., deputy-governor and joint managing director of Cables & Wireless, Ltd., and joint managing director of Imperial and International Communications, Ltd. His connection with Marconi interests was preceded by many years' work as a newspaper editor, and in public life. Between 1910 and 1922 he was M.P. for Bedford and he held a number of State offices. His war service included some years' work as Joint Parliamentary Secretary to the Ministry of Munitions, and in 1918 he became Deputy Minister of Munitions. After the war Mr. Kellaway was appointed Secretary to the Department of Overseas Trade, and, following the General Election of 1921, Postmaster-General. He was responsible in the latter capacity for the negotiations regarding broadcasting and wireless telephony in Great Britain which led to the formation of the B.B.C. During his period of office as P.M.G. he brought his business capabilities to bear upon the administration of the Post Office and produced for the first time since the war a surplus of income over working costs. It was at the end of 1924 that he joined the Marconi companies, his connection with the other two companies mentioned above dating from 1929. He was born at Bristol in 1870.

[*Elliott & Fry*

The late Mr. F. G. Kellaway

The Case for Plant Insurance

ENGINEERING insurance is almost a necessity under modern industrial conditions. The comprehensive policy, with its non-litigious characteristics obtainable to-day, makes a sound business proposition. The inspection service available from all the leading insurance companies is alone worth the premium charge, a fact that is well appreciated by owners of steam boilers and engines. Many important industrial concerns rely almost entirely on their insurance office for consultative service. The leading engineering insurance offices employ technical staffs of the highest qualifications, competent to devise and carry out every class of electrification scheme. Engineer surveyors are, in addition to their purely technical qualifications, shop-trained men, many being chartered engineers, and members of an exclusive association solely devoted to the interests of insurance engineer surveyors.

During the change-over from d.c. to a.c. supply proceeding in many districts, insurance engineer surveyors have been able to render valuable help in the conversion of clients' plant by suggesting important alterations with consequent economies in driving arrangements. In many cases useful practical advice has been available where a power user has been unduly impressed by the too-sweeping claims of an over-enthusiastic salesman regarding the performance of new plant.

Plant owners have sometimes decided not to continue insurance on new plant, but, as serious breakdowns do not come within the scope of the maker's guarantee, they have proved the folly of not having plant, especially "key" machines, fully protected against such eventualities. The best electrical machinery is liable to breakdown.

Power-plant owners affected by a change-over of supply would do well to ascertain exactly before accepting new plant whether its performance will prove equivalent to the plant replaced. Unexpected difficulties are apt to occur when changing over from d.c. to a.c. supply. Motor drives and starting problems, absent with d.c. operation, may call for extremely careful handling, and motors of 10 to 40 per cent. greater horse-power may be found necessary before the change-over will be satisfactorily completed. It is in such cases that the engineer surveyor as employed by the engineering insurance companies can render valuable service.—S. LEES.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Vernon Roome, Ltd.—Private company. Registered April 8th. Capital, £1,200 in £1 shares. Objects: To acquire the business of radio and general electrical dealers carried on by E. V. H. M. Roome and E. L. MacKay, at 43, Mint Walk, Croydon. The directors are: E. L. MacKay, 1, Fairfield Road, Croydon, E. V. H. M. Roome, "Pentyre," Plough Lane, Purley; and S. R. Brazier, 35, Derek Avenue, Hove. Secretary: S. R. Brazier. Solicitors: Gulliver & Burrow, 40, High Holborn, W.C.1.

Lennard's Radio, Ltd.—Private company. Registered April 12th. Capital £500 in £1 shares. Objects: To carry on the business of dealers in and manufacturers of radio sets, component parts, accessories and installations, electrical apparatus, etc. The subscribers are: P. Weinbaum, 9, Old North Street, W.C.1; and L. Jenkins, 9, Henderson Road, Forest Gate, E.7. Secretary (*pro tem.*), F. Loveridge. Registered office: 9, Old North Street, Bloomsbury, W.C.1.

John Ismay & Sons, Ltd.—Public company. Registered April 5th. Capital: £150,000 in 100,000 6½ per cent. cumulative preference shares of £1 each and 1,000,000 ordinary shares of 1s. each. Objects: To acquire the undertaking and all or any part of the assets of B.I.M., Ltd., and to carry on the business of manufacturers and suppliers of incandescent and electric lighting and other apparatus connected with the illuminating or

heating power of gas, electricity, and other light and heat producing agents, etc. First directors: J. Ismay, 10, Warwick Gardens, Ilford (chairman of B.I.M., Ltd.); E. J. Chapman, Westfield House, Fontwell, Arundel (director of B.I.M., Ltd.); A. D. Roberts, St. Eleth, Bull Bay, Anglesey. Solicitors: Laurence Jones & Co., Lloyd's Buildings, Leadenhall Street, E.C.

Watsand, Ltd.—Private company. Registered April 13th. Capital £200 in £1 shares. Objects: To adopt an agreement with A. Sanderson and W. T. Watson, and to carry on the business of manufacturers of cable ducts, pipes, poles, sleepers, columns, and other portable articles of concrete, reinforced concrete, or other materials, electrical engineers, etc. The directors are: A. Sanderson, 24, Kings Hall Road, Beckenham; W. T. Watson, 1, Beckenham Grove, Shortlands. Secretary, A. Sanderson. Registered office: No. 27 Arch, Selwood Street, Deptford, S.E.

Neon Luminous Tubes (Lund Signs), Ltd.—Private company. Registered April 12th. Capital £2,000 in £1 shares (1,000 6 per cent. cumulative preference and 1,000 ordinary). Objects: To adopt an agreement with C. A. N. Roberts, and to carry on the business of manufacturers of, agents and factors for, and dealers in, neon tubes in connection with advertising, lighting, electrical fittings, etc. The first directors are: C. A. N. Roberts, 57, Blackfriars Road, S.E.1; and E. A. Fowler, 19, Courtlands Drive, Ewell. Registered office: 57, Blackfriars Road, S.E.1.

Returns of Electrical Companies

Midland Counties Electric Supply Co., Ltd.—Particulars filed of four per cent. debenture stock to secure £1,000,000 authorised December 7th, 1932, and covered by trust deed dated March 31st, 1933, the amount of the present issue being £700,000. The deed constitutes a first specific charge on 2,200,000 £1 shares, each fully paid up and £500,000 6 per cent. debentures in the Derbyshire and Nottinghamshire Electric Power Co., and 1,733,000 £1 shares, each fully paid up and £360,000 5 per cent. debentures in the Leicestershire and Warwickshire Electric Power Co., and the company's undertaking and property, present and future, including uncalled capital (but excluding all shares, debenture stocks, debentures and other funded indebtedness, secured or unsecured in certain supply and traction companies). Trustees: Trustees Corporation, Ltd.

Mickelwright, Ltd.—Satisfaction to the extent of £500 on February 2nd, 1933, of debentures authorised December 7th, 1926, and registered December 9th 1926.

Darimont Electric Batteries, Ltd.—Capital, £18,000 in 62,000 ordinary shares of 5s. and 50,000 deferred shares of 1s. Return dated January 13th, 1933. All shares taken up. £8,999 16s. paid on 34,666 ordinary and 6,666 deferred shares, £9,000 4s. considered as paid on 27,334 ordinary and 43,334 deferred shares. Mortgages and charges, nil.

Automatic Light Control, Ltd.—Debenture dated April 5th, to secure £500 and further advances not exceeding in all £2,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: Light Controlled Installations, Ltd., Moorgate Hall, E.C.2.

Zenith Electric Co., Ltd.—Capital, £26,250 in 25,000 ordinary shares of £1 and 25,000 deferred shares of 1s. Return dated December 16th, 1932. 25,000 ordinary and 23,334 deferred shares taken up. £5,563 paid on 5,563 ordinary shares, £20,603 14s. considered as paid on 19,437 ordinary and 23,334 deferred shares. Mortgages and charges, nil.

W. Sanders & Co. (1915), Ltd.—Debenture dated March 16th to secure £500, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: Mrs. A. Hawkins, 55, Frederick Road, Wylde Green, Sutton Coldfield.

Electric Construction Co., Ltd.—Satisfaction to the further extent of £3,740 on March 30th of trust deed dated December 16th, 1897, and registered September 10th, 1908, securing £200,000 4 per cent. perpetual first mortgage debenture stock.

Electric Advertising Clocks, Ltd.—Capital, £36,000 in 30,000 ordinary shares of £1 and 120,000 deferred shares of 1s. Return dated December 31st, 1932. 27,492 ordinary and 120,000 deferred shares taken up. £8,600 paid (being 10s. per share on 17,200 ordinary shares), £16,292 considered as paid on the remainder. Mortgages and charges, nil.

Manor Radio, Ltd.—S. G. Grimes, 150, Southampton Row, W.C.1, was appointed receiver and manager on April 5th, under powers contained in debentures dated January 21st, 1932.

Simpsons Electricals, Ltd.—Particulars filed of £2,000 debentures authorised February 17th, 1933, charged on the company's property, assets, undertaking, and uncalled capital (subject to first debentures), the whole amount being now issued.

Alton District Electricity Co., Ltd.—The nominal capital has been increased by the addition of £20,000 in £1 ordinary shares beyond the registered capital of £5,000.

Pegasus, Ltd.—J. Hartley, Basinghall Buildings, Basinghall Street, Leeds, was appointed receiver and manager on April 6th, 1933, under powers contained in debentures dated January 20th, 1933.

National Utilities, Ltd.—Two debentures, both dated March 16th, 1933, each to secure all moneys due or to become due from the company to the debenture holders. Property charged: All agreements for the sale of vacuum cleaners, carpet sweepers, and other chattels, and all moneys payable thereunder, and the company's undertaking and assets, including uncalled capital (if any). Holders: (a) George Taylor, 21, Hale Low Road, Hale, Cheshire; and (b) James A. Hulme, 88, Mosley Street, Manchester.

City Notes

Telephone Properties, Ltd., held its annual meeting on April 12th. Sir Alexander Roger (chairman), who presided, in the course of his speech, said that they were successors to the Venezuela Telephone & Electrical Appliances Co., Ltd., which transferred its plant and other assets to the Compania Anonima Nacional Telefonos de Venezuela in exchange for shares and bonds of the Nacional Co. Venezuela had avoided the more acute effects of the world depression, and it was only during 1932 that the decline in commodity values and in the volume of trade, following the general contraction in demand, was felt. The effect of reduced business activities had led to some loss in stations by the Nacional Company, the number declining during the year from 17,077 to 16,535. New stations increased by 33 per cent., but cessations had the effect of putting the final balance on the wrong side. The gross receipts of the Nacional Co., however, increased. Venezuela was now in radio-telephone communication with practically the whole world through the media of the direct links which it had established with European countries and the United States. The Nacional Co. had played no small part in the establishment of this service, which was operated locally by means of the company's telephone systems. The Venezuelan Government had placed the administration of this new undertaking under the direction of the Nacional Co., and it was anticipated that the service would prove an increasing source of revenue. Regarding the future they shared the confidence of the management of the Nacional Co. that station losses were temporary and would be made good as time went on.

The North Metropolitan Electric Power Supply Co. was to hold an extraordinary meeting yesterday (Thursday) to consider a resolution authorising the creation of 500,000 ordinary shares of £1 each, ranking *pari passu* with the existing ordinary capital. It is proposed to offer the new shares at the price of £2 per share to ordinary shareholders in the proportion of one new share for every four held. Holders of the 5½ per cent. debenture stocks have been notified of the company's intention to redeem the stocks at 102½ per cent. on January 1st, 1934. It is proposed to create a new 4 per cent. debenture stock and to issue so much of the stock as may be requisite to carry into effect the offer of exchange. Holders of existing 5½ per cent. debenture stocks are invited to exchange their holdings into a like amount of the new 4 per cents., on which a full half-year's interest will be paid on July 1st next. Holders who exchange will receive after allotment a cash payment by way of interest at the rate of £1 10s. per cent. (less tax) to make up the interest to 5½ per cent. for 1933, and a capital cash payment, representing the premium payable on redemption of the existing stocks, at the rate of £2 10s. per cent. The offer to exchange is open for acceptance until April 24th.

The Canadian General Electric Co., Ltd., reports profits for 1932 of $1,165,660, as compared with $2,308,153 for the previous year. This is after deducting manufacturing costs distribution, provision for reserves, depreciation and taxes. The company has experienced a considerable reduction in the value of sales, and commenced the year with a smaller number of unfilled orders. The dividends on the preferred stock amounted to $559,042, and on the common stock to $755,380. Current assets amounted to $18,429,567, and current liabilities to $2,810,168.

The North Somerset Electric Supply Co., Ltd., reports a profit for 1932 of £34,028, which with £1,719 brought in, dividends from subsidiary companies (£1,648), and interest (£376), makes £37,771. As announced in our issue of March 24th, the ordinary dividend is 7 per cent., and £1,881 is carried forward. The sales of electricity increased from 11,265,767 kWh to 13,607,845 kWh.

The Western Union Telegraph Co. reports gross operating revenues of $83,013,712 for 1932, as compared with $108,736,948 for 1931. Operating expenses totalled $80,068,437 ($99,215,431), and after meeting bond interest there is a deficit of $842,595, which with other charges is deducted from the surplus account, leaving a surplus to go forward of $89,031,149.

The Wellingborough Electric Supply Co., Ltd., reports a total revenue for 1932 of £27,414 and a profit of £4,148. A dividend of 5 per cent. is paid and £1,992 is carried forward. The electricity energy sold totalled 2,617,986 kWh, an increase of 10.2 per cent.

The Brazilian Traction, Light & Power Co. has announced that in view of continuing exchange and remittance difficulties, it has decided that no dividend can be paid on the ordinary shares at this time.

Companies to be Struck Off the Register.—The names of the undermentioned companies will be struck off the Register at the expiration of three months unless cause is shown to the contrary: Fellows Magneto Co., Ltd.; Hendon Electric Lamp Co., Ltd.

Stocks and Shares

THE weight of accumulated, and ever-accumulating, capital is responsible for the strength of securities that extend from the War Loan to the best industrials. Investors do not know what to do with their money. To such a condition of financial affairs has this led that the income from a thousand pounds is equivalent nowadays to little more than ten shillings a week, if the money is invested in British Government stocks. The popular slogan of "Spend for Employment" receives adventitious aid from the fact that the tangible result of thrift, as measured by the yield obtainable on money, is so meagre. Programmes of electrical development work can be undertaken to-day with the certainty that monetary requirements, given reasonable security, can be satisfied upon terms more satisfactory to the borrower than they offer to the lender.

New Issue Premiums

Were concrete confirmation required of the investor's demand for Stock Exchange securities, this brief list of new-issue prices would provide examples:—

Stock or Share.	Dividend Per cent.	Issue. Price.	Present Premium.
Crompton Parkinson 2nd pref.	6	22s. 6d.	4s. 6d.
General Electric debs.	4½	105	2
Llanelly Elec. ordy.	—	21s. 6d.	4½d.
London Power debs.	4	101½	4½
Perak River Hydro-Electric debs. ...	4	98½	1½

By way of exception, the 8 per cent. preference shares of

Lissen, Limited, recently offered at 23s. by the Ever-Ready Trust, are now quoted at 1s. below the issue price. It will be observed that London Power 4 per cent. debentures stand at 106 for the fully paid scrip, in spite of the fact that the debentures are dated 1952-1972, and are liable to be redeemed at 100 in nineteen years' time. The buyer must make allowance, of course, for such a possibility when he puts money into this, or any other security to which are attached dates for repayment.

North Metropolitans

Not every new issue is regarded as a bull point for holders of the existing stock. The North Metropolitan Electric Power Supply Company announced, two months ago, that a scheme was under consideration for a share offer and conversion. Upon the strength of this, "North Mets." were run up to 63s. 6d. The directors now propose to offer new shares at the price of 40s. to holders of the old ordinary shares, in the proportion of one new for every four old. Hopefulness had looked for one new in every three old. The price consequently dropped back to 59s. 3d. There was a certain amount of disappointed selling: when this is finished, the price will probably recover. With this offer of new shares, the board intimates its intention to pay off the company's 5½ per cent. debenture stocks at 102½ on January 1st next, and to substitute therefor a new 4 per cent. debenture stock into which the proprietors of the present debentures are to be invited to exchange their holdings. This offer to exchange the stocks will remain open only until Monday in next week, April 24th.

Home Electricity Supply

Prices in the lists of shares in this group show comparatively few changes. Hendons are harder at 49s. 6d., which is ex the bonus. Scottish Power and Clyde Valley have come in for a little attention upon the interesting rumour that an amalgamation, working agreement or fusion of interests may be on the *tapis*. An increase of 7.7 per cent. is noticeable in the number of units of electricity generated by authorised undertakers in Great Britain, for the quarter ended March, as compared with the first three months of 1932. This year's increase over the figures for the first quarter of 1931 is nearly 14 per cent.

Home Rails and Others

Metropolitan District ordinary has strengthened to 64¼, and the company's 5 per cent. debenture of 1965-1995 to 120½. The Home Railway market is better as a whole. Traffics are beginning to make a slightly less lugubrious showing, and the glorious weather which prevailed throughout the Easter holiday was enough to encourage passenger travelling. Such considerations, however, have little more than an indirect influence over Underground stocks, the prices in which are affected chiefly by estimates of the value to be placed upon the forthcoming issues of the London Passenger Transport Board. The London Tramways descriptions hold their recent rises.

Torquay Tramways shares are flat at 28s. 9d., which is 3s. 9d. down. British Electric Traction preferred ordinary is a point lower at 134. In the Foreign division, Mexican Tramways fives have dropped to 30½, a further fall of 2. The flatness is due to suspension of sinking-fund purchases. Brazilian Tractions once more achieve double figures by an advance of ⅜ to 10. No dividend is to be paid on the common shares this time, as against a stock dividend of 2 per cent. distributed a year ago. Exchange and remittance difficulties are held responsible for the present decision of the directors.

Cables and Wireless

The 5½ per cent. preference stock of Cables & Wireless is better at 83½, and there has been speculative buying of the "B," which raised the price to 11. Great Northern Telegraphs keep a good market after their 30s. gain of last week: the support is still largely Danish in its origin. American Telephone & Telegraph, after rising to 137, fell back to 127½. International Telephone & Telegraph shares are quoted at 9½.

The chairman of Telephone Properties, the interests of which are almost entirely in Venezuela, mentioned at last week's meeting that the company had more withdrawals in the year under review than new subscribers. Time will probably prove the correctness of his prediction that former users of the telephone will be among the first to require service when times improve. The ordinary shares stand at 20s. 6d. and the preference at 23s. Cuban Telephone 5 per cent. first mortgage bonds are 10 lower at 75.

Equipment and Manufacturing

A sharp spasm of flatness occurred in Associated Electrical Industries ordinary, but a rally to 15s. 9d. left the price no more than sixpence down on the week. British Aluminium are better at 25s. English Electrics keep about 7s. 6d. and 11s. 3d. for ordinary and preference respectively. Shrinkage in export business was one of the principal causes assigned by the chairman at the recent meeting to account for the disappointing results of last year, another factor being restriction of capital expenditure by public bodies at home. Telephone Manufacturing at 4s. are a shade harder.

The iron and steel market is quiet. Most of the markets round the Stock Exchange appear to have difficulty in throwing off the effects of the break caused by the holidays. The rubber share market has braced up, owing to a trifling advance in the price of the produce.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1930.	1931.	Price, Apl. 18.	Rise or Fall.	Yield. £ s. d. p.c
Home Electricity Companies.						
Bournemouth and Poole	1	15	15	73/9	—	4 1 4
Brompton Ordinary	1	8½	8½	33/6	—	4 3 7
Central Electricity 4½% Deb. ...	Stock	4½	4½	108	—	4 3 4
Charing Cross Ordinary	1	8½	8½	33/6	—	4 3 7
Chelsea	1	8½	8½	33/-	—	4 4 10
City of London	1	10	10	33/6	—	4 3 7
Clyde Valley	1	8	7	35/-	—	4 0 0
County of London	1	11	10½	53/9	—	3 18 8
Edmundsons' 7% Pref.	1	7	7	30/6	—	4 11 10
Elec. Dis. Yorkshire	1	9	9	45/9	—	3 18 7
Elec. Supply Corporation	1	11	11	66/3	—	3 6 8
Kensington Ordinary	1	8	8	33/-	—	4 4 10
Lancs Light and Power	1	6½	7	32/6	—	4 6 2
London & Home Counties 4½% Deb.	Stock	4½	4½	108	—	4 3 4
London Electric	1	9	9	32/6	—	4 6 2
Metropolitan	1	10	10	50/-	—	4 0 0
Midland Counties	1	7	7	35/-	—	4 0 0
Mid. Elec. Power	1	8	8	38/9	—	4 2 6
North Eastern Electric Ordinary...	1	6	6	30/-	—	4 0 0
Do. 7% Pref.	1	7	7	33/-	—	4 4 10
Northampton	1	10	10	50/-	—	4 0 0
Notting Hill 6% Pref.	10	6	6	13½	—	4 10 7
North Met. Elec. 6% Pref. ...	1	6	6	30/6	—	3 18 8
St. James' and Pall Mall	1	8	8	32/6	—	4 6 2
Scottish Power	1	8	8	36/3	—	4 8 2
South London	1	8½	8½	33/-	—	4 4 10
Urban Ordinary	1	7	7	38/9	—	3 12 2
Westminster Ordinary	1	8½	8½	32/6	—	4 6 2
Whitehall Elec. Invst. 7½% Pref....	1	7½	7½	17/6	—	8 11 2
Yorkshire Elec.	1	8	8	42/6	—	3 15 3
Home Rails.		1931	1932			
Central London Ord. Assented ...	Stock	4	4	84½	—	4 14 7
Metropolitan	„	2½	1½	71½	—	2 4 0
Do. District	„	4½	3	61½	+1	4 13 0
Underground Electric	1	7	4½	19/6	—	4 12 4
Telegraph and Telephones.		1930	1931			
American Tel. & Tel.	$100	9	9	127½	—9½	7 1 2
Anglo-Am. Tel. Pref.	Stock	6	6	102½	—	5 17 1
Do. Def.	„	1½	1½	24½	—	6 2 5
Cables & Wireless 5½% Pref. ...	„	5½	2½	83½	+1	3 5 10
Do. A 7½% Ord.	„	—	Nil	28	—	—
Do. B Ord....	„	—	Nil	11	+½	—
Globe Tel. and T. Ord.	10	8½	Nil	11	—	—
Do. do. Pref.	10	6	6	11½	—	5 2 2
Great Northern Tel.	10	20	20	28½	—	7 0 0
Marconi-Marine	1	15	10	28/9	—	5 4 4
Oriental Telephone Ord.	1	12	12	3	—	•4 0 0
Home and Foreign Trams, Etc.						
Anglo-Arg. Trams First Pref. ...	5	—	—	1/9	—	—
Do. do. 2nd Pref.	5	—	—	1/9	—	—
Do. do. 5% Deb.	Stock	—	—	5	—	—
British Electric Traction Def. Ord.	„	5	5	255	—	—
Do. do. Pref. Ord.... ...	„	8	8	134	—1	5 19 5
Brazil Traction	100	—	—	10	+⅜	—
Brit. Columbia Elec. Rly. Pce. ...	Stock	5	5	102½	—	4 19 6
London & Sub. Trac. 5% Pref. ...	1	Nil	Nil	15/-	—	—
London United Tram Deb. ...	Stock	4	4	73½	—	5 8 10
Mexico Trams, 5% Bonds... ...	—	5	5	30½	—2	17 17 0
Mexican Light Common	100	Nil	Nil	7½	—	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	64½	—2½	7 15 0
Victoria Falls Ord.	1	15	15	4½	—	3 10 6
Yorkshire (West Riding)	1	Nil	Nil	6/-	—	--
Manufacturing Companies.						
Assoc. Elec. Ord.	1	6	4	15/9	—6d.	5 1 7
Do. Pref.	1	8	8	30/-	—	5 6 8
Babcock & Wilcox	1	14	14	33/9	—	—
British Aluminium Ord.	1	10	5	25/-	+6d.	4 0 0
British Insulated Ord.	1	15	15	70/-	—	4 5 9
Brush Ord.	Stock	5	Nil	45	—	—
Callender's	1	15	15	2½	—	5 2 0
Do. 6½% Pref.	1	6½	6½	28/9	—	4 10 5
Crompton Parkinson Ord.... ...	5/-	30	24	21/6	—	5 2 4
Do. 8% Pref.	1	8	8	32/6	—	4 18 6
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nil	11/3	—	—
Enfield Cable Ord.	1	25	25	4½	—	5 11 1
English Electric	1	Nil	Nil	7/6	—	—
Do. do. Pref.	1	Nil	Nil	11/3	—	—
Ever Ready...	5/-	35	35	28/9	—	6 8 6
Ferranti Pref.	1	7	7	23/6	—	5 19 2
G.E.C. Pref....	1	6½	6½	29/9	—	4 7 5
Do. Ord....	1	10	8	2	—	4 0 0
Henley's	1	30	30	6½	—	4 16 0
Do. 4½% Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber	1	Nil	Nil	2/6	—	—
Johnson & Phillips	1	10	5	18/3	—	5 9 7
Siemens Ord.	1	7½	7½	26/3	—	5 14 3
Telegraph Construction	£1	Nil	Nil	18/9	—	—

• Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1931

23117. "Means for protecting continuous current to polyphase current conversion systems employing metal-vapour valves." Akt.-Ges. Brown, Boveri et Cie. September 2nd, 1930. (389849.)

23158. "Devices for automatically regulating the pressure of alternating currents." Electro-Constructions Soc. Anon. August 18th, 1930. (389811.)

25565. "Apparatus for producing electrical impulses of very high voltage." A. Brasch and F. Lange. September 11th, 1930. (389813.)

26071. "Electric insulating materials." British Thomson-Houston Co., Ltd. September 18th, 1930. (389816.)

26374. "Direction-responsive devices." British Thomson-Houston Co., Ltd. September 22nd, 1930. (389819.)

26380. "Automatic switches for use in telephone or like systems." Associated Telephone & Telegraph Co. September 29th, 1930. (389820.)

26398. "Method of, and means for, transmitting electric current waves over transmission lines of high attenuation." Electrical Research Products, Inc. September 30th, 1930. (389821.)

26402. "Electrically conducting coatings." F. H. Baggaley. September 21st, 1931. (389822.)

26483. "Electric motor control systems." British Thomson-Houston Co., Ltd., and W. J. Pool. September 22nd, 1931. (Cognate application 26579/31.) (389828.)

26557. "Wireless receiving and like apparatus." Paragon Rubber Manufacturing Co., Ltd., and H. C. Atkins. September 23rd, 1931. (389831.)

26684. "Electric telegraphic systems." Electrical Research Products, Inc. October 8th, 1930. (389838.)

26685. "Sound-translating devices." Electrical Research Products, Inc. October 4th, 1930. (389839.)

26691. "Telephone systems." Automatic Electric Co., Ltd. November 14th, 1930. (389840.)

26752. "Telegraph signal-transmitting apparatus having signal storage." Creed & Co., Ltd. (Teletype Corporation.) September 25th, 1931. (389854.)

26782. "Electric amplifying circuits." British Thomson-Houston Co., Ltd. September 26th, 1930. (389855.)

26806. "Lead-covered electric cables." Telefonaktiebolaget L. M. Ericsson. May 2nd, 1931. (389859.)

26837. "Telephone systems." Automatic Electric Co., Ltd., G. T. Baker and R. Taylor. September 25th, 1931. (389867.)

27384. "Electrical circuit breakers." British Electrical and Allied Industries Research Association, W. B. Whitney and E. B. Wedmore. October 1st, 1931. (Addition to 366998.) (389882.)

27457. "Electric fuses." Allen West & Co., Ltd., A. West and V. Breeze. October 2nd, 1931. (389883.)

27769. "Electrodes for discharge tubes." B. Erber and A. Schwitzer (trading as G. Ganz & Co.). October 6th, 1930. (Addition to 371419.) (389886.)

28007. "Condenser microphones." British Thomson-Houston Co., Ltd., and G. S. C. Lucas. October 8th, 1931. (Patent of addition not granted.) (389888.)

28316. "Moulded insulating masses for electrical purposes." International General Electric Co., Inc. October 13th, 1930. (389892.)

28408. "Electric protective arrangements." Electrical Improvements, Ltd., and H. B. Poynder. October 13th, 1931. (389893.)

29404. "Oscillatory electric circuits." R. E. H. Carpenter and P. P. Eckersley. October 22nd, 1931. (389896.)

30404. "Permanent magnets." Darwins, Ltd., and W. Brown. November 3rd, 1931. (389898.)

30518. "Counting arrangements for totalisator and other totalising apparatus." Ericsson Telephones, Ltd., and C. W. Willman. November 4th, 1931. (389899.)

31131. "Electric glow discharge lamps." Westinghouse Lamp Co. November 21st, 1930. (Addition to 374466.) (389904.)

31497. "Thermionic amplifying devices." British Thomson-Houston Co., Ltd., and A. L. Whiteley. November 13th, 1931. (389905.)

32016. "Electric time-measuring and time-switching devices." International General Electric Co., Inc. November 18th, 1930. (389908.)

33509. "Electric signalling or control systems." General Electric Co., Ltd., F. B. Willis and E. P. L. Westell. December 3rd, 1931. (389916.)

33510. "Apparatus for generating electric waves." General Electric Co., Ltd., and D. C. Espley. December 3rd, 1931. (389917.)

34045. "Apparatus for testing the readings in measuring circuits for alternating current with a direct current instrument and an electro-mechanical synchronous switch." L. Mellersh-Jackson (Siemens & Halske Akt.-Ges.). December 8th, 1931. (389919.)

34273. "Circuit arrangements for manually operated telegraph exchange systems." Siemens & Halske Akt.-Ges. December 24th, 1930. (389922.)

34877. "Voltage regulating systems for alternating-current circuits particularly suitable for the control of electric locomotives." International General Electric Co., Inc. December 16th, 1930. (389927.)

34920. "Construction of air cooler for electrical machines." St. George's Engineers, Ltd., H. Purslow, Lancashire Dynamo & Motor Co., Ltd., and J. W. Howard. December 17th, 1931. (389928.)

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141. "Valve arrangements for use in gas-blast electric switches." International General Electric Co., Inc. January 2nd, 1931. (389938.)

232. "Electric fans." General Electric Co., Ltd., and N. F. T. Saunders. January 4th, 1932. (389939.)

1043. "Electric signalling arrangements for totalisators." Siemens Bros. & Co., Ltd., and J. H. Broome. January 13th, 1932. (389943.)

1070. "Control of electro-motors applicable for driving shearing machines." Demag Akt.-Ges. January 14th, 1931. (389944.)

1163. "Method of striking and maintenance of an electric arc in a medium having a great dielectric strength." Soc. Anon l'Air Liquide pour l'Etude et l'Exploitation des Procédés G. Claude. January 17th, 1931. (389946.)

1256. "Audiophones." W. G. G. Benway. January 26th, 1931. (389943.)

3065. "Electrical indicators." Ericsson Telephones, Ltd., and G. R. Newell. February 2nd, 1932. (389959.)

4562. "Electric insulator." F. Morris. February 16th, 1932. (389966.)

5025. "Electric signalling circuits with thermionic valves." General Electric Co., Ltd., and D. C. Espley. February 19th, 1932. (389970.)

5300. "Electric welding of articles arranged in series." F. Schull. February 22nd, 1932. (389973.)

5413. "Electric switchgear." British Thomson-Houston Co., Ltd. February 24th, 1931. (389975.)

8714. "Method of applying striking or chiming mechanism to electrically driven clocks." H. Haycock, F. W. Haycock and H. Haycock. March 24th, 1932. (389990.)

11079. "Electrical regulators." British Thomson-Houston Co., Ltd. April 17th, 1931. (389997.)

11367. "Keyboard controlled current impulse transmitters." H. Fuld & Co. Telephon-und Telegraphenwerke Akt.-Ges. May 1st, 1931. (389999.)

11678. "Electrical signalling device." Lampen-und Metallwaren-Fabriken R. Ditmar Geb. Brunner Akt.-Ges. April 22nd, 1931. (390002.)

13139. "Electric switches." M. Bouvet. May 6th, 1932. (390009.)

14875. "Radio receivers." Marconi's Wireless Telegraph Co., Ltd. (Radio Corporation of America). May 25th, 1932. (390021.)

15079. "Electric lighting plant." R. Bertele. May 27th, 1931. ((390022.)

16709. "Radio receivers and kindred apparatus." Marconi's Wireless Telegraph Co., Ltd. June 12th, 1931. (390026.)

18654. "Electric hot-water tanks." T. Stiebel. July 1st, 1932. (390034.)

20542. "Electric discharge devices controlled by light." Technik & Investment Akt.-Ges. July 30th, 1931. (390041.)

21617. "Electric heating panels." F. Braby & Co., Ltd., G. O'Kill, and J. E. Nicholls. August 2nd, 1932. (390047.)

22686. "Hand electric steering gear for dirigible craft." Sperry Gyroscope Co., Inc. March 26th, 1932. (390051.)

24971. "Arc-welding apparatus." G. D. Peters & Co., Ltd. (Wilson Welder & Metals Co., Inc.). September 7th, 1932. (390060.)

26131. "Wireless signalling system." Hazeltine Corporation. September 10th, 1930. (Divided application on 23166/31.) (389869.)

26339. "Electrically lighted vacuum cleaner." W. C. Fairweather (Singer Manufacturing Co.). September 22nd, 1932. (390068.)

27408. "Manufacture of aluminium in electrolysis cells of high power." Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges et Camargue. October 21st, 1931. (390076.)

28019. "Screening of electrical devices for internal-combustion engines to prevent interference with wireless signalling." W. Bryan and Simms Motors Units, Ltd. October 7th, 1932. (390083.)

29349. "Automatic voltage regulators." Ferranti, Ltd., and E. D. T. Norris. October 20th, 1932. (390090.)

31779. "Surge-proof electrical transformers." Westinghouse Electric & Manufacturing Co. December 1st, 1931. (390102.)

33947. "Mercury-vapour lamps." G. Gourdon. November 30th, 1931. (390108.)

35185. "Devices for converting electrical oscillations into acoustic vibrations or inversely." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. December 23rd, 1931. (390109.)

35236. "Electric tumbler switches." J. S. Michaelson and A. G. Bellamy. December 12th, 1932. (390111.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from April 12th:—

Pilot, made in U.S.A. (lettering and design). No. 522697. Class 8. Radio receiving sets and parts thereof.—Pilot Radio and Tube Corporation, Brooklyn, N.Y. (British representatives: Frank B. Dehn & Co., Kingsway House, 103, Kingsway, W.C.2.)

Dynator. No. 538684. Amplitor. No. 538686. Class 8. Instruments and apparatus, and parts thereof, for use in radio-telegraphy and telephony.—Telsen Electric Co., Ltd., 79, Thomas Street, Aston, Birmingham.

Hermion. No. 538444. Class 8. Telegraphic, telephonic and radio-telegraphic and telephonic apparatus and parts thereof, electricity meters, measuring instruments, electrically operated cinema apparatus, electric lamps for scientific purposes, electrically operated speed, distance, and pressure indicators, rheostats, pyrometers, electric signalling apparatus, and accumulators and batteries (not for medical purposes). No. 538445. Class 13. Electrical goods and fittings of ordinary metal and electric lamps (ordinary). No. 538562. All goods in Class 15. No. 538563. Class 18. Heating and cooking electric stoves, radiators for heating, and lighting installations.—General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.

Radio Atmospherics in Australia

The progress of an investigation into radio interference by natural atmospherics is outlined in Bulletin No. 68 of the Australian Radio Research Board. This report (No. 5, 49 pages, 13 figs.) describes the cathode-ray direction finders which are used for this work as well as data obtained from land and sea observations, and the conclusions which have been drawn therefrom.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Alterations to schools; J. A. O. Allan, architect. Alterations and additions for Watt & Milne; G. Bennet Mitchell & Son, architects.

Aberystwyth (CARDIGANSHIRE).—Maternity wards; J. Lewis Evans, county architect, 21, Great Darkgate Street.

Accrington.—Estate development, Miller Fold Road; Miss C. M. Pickup.

Ashington.—Houses (66); G. Towers, builder, Union Street, Blyth.

Ayr.—Hotel (£75,000); W. A. Davidson, accountant. Extension of esplanade (£7,000); burgh surveyor.

Bakewell.—Houses (42); G. V. Sayner, R.D.C. architect, 5, The Quadrant, Buxton.

Banffshire.—School, Findochty; director of education, Banff.

Beddington and Wallington.—Public offices (£31,000); U.D.C. surveyor.

Bedford.—Houses, Rosamond Road; H. C. Janes, Ltd. Extensions, 7-11, Midland Road; F. W. Woolworth & Co., Ltd.

Bicester.—Houses (20); U.D.C. surveyor.

Birmingham.—Extensions, Midland Skin Hospital, John Bright Street (£30,000); A. S. N. Cooke, architect, Sun Buildings, Bennett's Hill.

Blackpool.—Houses, Cherry Tree Lane; G. W. & H. Lawson. Houses (116), Fir Grove Estate; J. Gregson & Son. Houses (31), Links Road; R. Fielding & Son. Houses, Little Carleton; Sir Lindsay Parkinson & Co., Ltd. Houses, Park Road; F. Schofield. Houses, Priory Gate; P. W. Emery & Son. Houses, Stanley Road, Little Marton; T. Walker. Houses, Stoney Hill Avenue; C. Woodhead. Development of Horncliffe Estate; Gorst & Crabtree. Reconstruction of L.M.S. railway station; Ashton Davies, engineer, L.M.S. Railway.

Blyth.—Houses (200); L. Leeper, borough engineer.

Bradford.—Houses (12), Bowling Old Lane; Fortune & Jackson. Houses (17), Cooper Lane; Thompson & Son.

Bristol.—Houses (100), Knowle Estate (£28,800); John Knox (Bristol), Ltd.

Bury.—Shops, showrooms, and office premises, Rock Street (£30,000); J. Tinline & Sons, Ltd., builders, Parker Street.

Carlisle.—Houses (27), Freer Street; S. W. B. Jack, architect. Houses (20), Garlands Road; Border Engineering Contractors, Ltd. Development of Brunton Estate, Warwick Road; Gilbert Hill. Premises for Shell Mex, Ltd., Dalston Road.

Chester.—Houses (16), Liverpool Road; T. Warrington & Sons. Shop, Nicholas Street; Douglas Minshull & Williams, architects. Telephone exchange, Little Street; Office of Works. Alterations, poor law institution; city engineer.

Chester-le-Street.—Development of housing sites; W. C. Leech, builder, Coutts Road, Newcastle.

Colchester.—Business stores, Crouch Street; J. W. Trudgett, builder.

Cumnock.—Houses (89), Barrhill Road, with electrical work; burgh surveyor.

Darlington.—Extensions to premises of the North of England Newspapers, Ltd., Priestgate.

Dartford.—Houses (52), Hallford Way; W. J. Brise. Houses (30), Priory Road; C. E. Squire.

Deal.—Conversion of Pavilion into cinema (£6,000) for Kent Cinemas, Ltd.

Dewsbury.—Houses (13), Dawsgreen; borough engineer and trade contractors. Works alterations, Oates Street; Luke Howgate & Son, Ltd.

Dorchester.—Houses (11), London Road; P. Alderman.

Douglas (I.O.M.).—Alterations, Bowling Green Hotel; W. H. Okell & Son, Ltd. Alterations, Strand Street, for F. W. Woolworth & Co., Ltd.

Dunoon.—Cinema, Argyll Street (£10,000); E. A. Sutherland, architect, Glasgow.

Easthampstead (HERTS).—Houses (24), Ascot Heath; R.D.C. surveyor.

Enfield.—Flats, Hoe Lane (£6,240); U.D.C. surveyor.

Falkirk.—Extensions, Gothic Iron Works, for R. and A. Main, Ltd.; the manager.

Farnham.—Shops, flats, and houses, Ridgway Road; H. Cox.

Featherstone (YORKS).—Library; W. Hamilton Fearnley, architect, Station Lane.

Folkestone.—Pavilion, East Cliff (£6,000); borough engineer.

Guidebridge (LANCS).—Mill, for the Guidebridge Spinning Co., Ltd.; W. Storrs, Sons & Co., Ltd., builders, Stalybridge.

Hampton.—Houses (10), Hatherop Road; R. Hewitt, Ltd. Houses, Cranmer Road; H. Joyce & Son.

Hastings.—Houses, Harold Road; A. J. Dicker.

Hayes (KENT).—Dairy, &c., Station Approach; Express Dairy Co., Ltd., 26, Tavistock Place, London, W.C.

Hebburn-on-Tyne.—Houses (26), Victoria Road West; C. McGhie, architect, Collingwood Buildings, Newcastle. Shops for Mr. Finn; A. Ridley, builder, Dene House, Dean Road, South Shields. Extensions, Council Offices, Argyll Street; T. A. Page & Sons, architects, 67, King Street, South Shields.

Horden (DURHAM).—Houses (73), various sites, for G. Riddell (Horden), Ltd., builders.

Hull.—Alterations and additions to North West Lodge, Mental Hospital Willerby (electrical installations); A. S. Jones (Hull), Ltd., builders, Seaton Street.

Ilford.—County court premises; H.M. Office of Works, King Charles Street, S.W.1.

Inverness.—Bank extensions, Church Street (£2,500), for the Commercial Bank of Scotland, Ltd., Edinburgh.

Irish Free State.—(CAVAN).—Houses (16); P. Brady, acting town surveyor, Town Hall. (DUBLIN).—Houses (140), Friends' Fields housing area; Corporation housing architect, 3, Parliament Street. (DUNDALK, CO. LOUTH).—Houses (46); J. F. Doris, town surveyor. (GRANARD, CO. LONGFORD).—Houses (24); P. K. McNally, U.D.C., engineer.

Kidsgrove (STAFFS).—Council offices (£2,000); U.D.C. surveyor.

Kingston-on-Thames.—School (£11,000); director of education.

Kirkintilloch.—Police buildings (£8,000); clerk, County Council, Dumbarton.

Leeds.—Garage for Montague Burton, Ltd., Hunslet (electrical installation); L. Gomme, architects' department. Pithead baths, Fanny Pit, Rothwell Haigh; J. H. Forshaw, architect, Miners' Welfare Committee, Dean Stanley Street, S.W.1.

Lewes.—Estate development (30 acres); agent to Abergavenny Estates.

Liverpool.—Buildings for Society of the Poor Servants of the Mother of God (£7,000), with electrical installations; C. J. Doyle, builders, 15, Victoria Street.

London.—(CATFORD).—Houses, Farm Estate; A. J. Glock, Ltd. Church, Bromley Road, for Southend Village Baptist Mission; secretary. Factory extension, Manor Lane; J. W. Faulkner & Sons, Ltd. (HACKNEY).—Reconstruction of Empress Cinema, Mare Street; licensee. (LEE).—Houses (46), Baring Road; Chart, Son & Reading. (LEWISHAM).—Houses, De Frene Road; R. B. Rowell. Development of Dunoon Road Estate; E. C. Christmas.

Lowestoft.—School, Notley Road (£14,500); borough surveyor.

Maidstone.—Covered market, Earl Street and Market Street; E. R. Hill, 20, Tovil Road.

Malling (KENT).—Houses (48), Aylesford; R.D.C. surveyor.

Melksham.—Houses (56), Spa Road, for Taylor-Woodrow, Ltd., Hayes, Middlesex.

Newcastle-on-Tyne.—Houses, South Benwell Estate, for C.C. Church, St. Anthony's Estate, for the Methodist authorities.

Newport (I.O.W.).—Houses (42), Council Estates (£13,800); borough engineer. County hall; county surveyor.

Norfolk.—School, Old Buckenham; director of education, Norwich.

Northam.—Houses (20); Council surveyor.

Northampton.—Re-erection of boot factory (£150,000), for Hornby & West, Ltd., and the Cantilever Shoe Co., Ltd.

Oldbury.—Houses (74); U.D.C. surveyor.

Padiham (LANCS).—Houses; U.D.C. surveyor.

Pontefract.—Bazaar stores, Beastfair; Marks & Spencer, Ltd., London.

Portland.—Houses, Council Estate (£8,400); G. P. Unwin.

Reading.—Corn exchange (£10,000); borough surveyor.

Rochford.—Extensions, poor law hospital; Southend Assistance Committee.

Rotherham.—Public abattoir and meat market (£10,500); borough surveyor.

Rowley Regis.—Houses (146); Housing, Ltd., builders, Blackheath, Worcs.

Runcorn.—School (£5,073), for E.C.; T. Warrington & Sons, builders, Ellesmere Port.

Ryton-on-Tyne.—Houses (25); Appleby & Co., builders, 20, Walter Terrace, Newcastle. Development scheme near Woodside for W. H. Charlton & Sons, builders, Pay Gate, Crawcrook.

St. Albans.—Houses (100), Hatfield Road, for the Workmen's Housing Association, Ltd.

St. Helens (LANCS).—Houses (32), Hardshaw Brook; A. P. Statham, borough engineer.

Scarborough.—Houses (50), Northstead; borough engineer. Estate development, Seamer Road; Wilkinson & Guthrie. Shop premises, 84-5, Newborough; M. Burton, Ltd.

Slough.—Lido and Road House, with ballroom, restaurant, &c. (£40,000); D. Hartley, architect, Mackenzie Street.

Spalding.—Pumping station, Donington; Silcock & Simpson, R.D.C. engineers, 10, Park Row, Leeds.

Stobswood (NORTHUMBERLAND).—Miners' institute; F. H. Burn, managing director of the Stobswood Coal Co.

Stockton-on-Tees.—Municipal offices (£47,500); J. P. Wakeford, borough engineer.

Wallsend.—Houses (10), Benton Way; Clarke Bros. Completion of Holy Cross housing scheme; borough engineer.

Washington (DURHAM).—Houses (24), (£5,777); J. Barrow, builder, Jarrow.

Watford.—Development of Kingswood Estate; Mr. Gillitt. Estate development, St. Albans Road; A. & L. Wilkins.

Wilmslow.—Cinema, Groves Street (electrical installation); J. W. Beaumont & Son, architect, 24, Brazennose Street, Manchester.

Wincanton.—Houses (20); H. N. Alves, R.D.C. architect, 27, High Street, Glastonbury.

Wolverhampton.—Offices, banking hall, &c. (£25,000); R. Speake & Sons, builders.

Worcester Park (SURREY).—Odeon Theatre, electrically equipped; Yates, Cook & Derbyshire, architects, 43, Great Marlborough Street, Regent Street, London.

The Gas Light and Coke Co.'s Bill

On April 11th the Select Committee of the House of Commons which has been considering the Bill promoted by the Gas Light & Coke Company gave its decision. It approved the measure and passed the clause which prohibits the making by the housing authorities of districts in the area of supply of the company of conditions regarding the form of heat, light, energy or power to be supplied or used in certain cases. This would mean that municipal tenants who have hitherto been restricted to the use of electricity would be entitled to ask to be supplied with gas, or *vice versa*, but the Bill has yet to pass the Lords. The Commons Committee added a proviso to the effect that the housing authorities will be able to make "any reasonable terms or conditions as to the position of any fittings required for the use of any form of heat, light, power or energy."

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